JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Parliamentary Prospects—Notable Amalgamation Scheme.

IN the opening sentences of an editorial article recently, dealing with the parliamentary gas measures of this year, it was predicted that the coming session of Parliament would, if all went well, witness some gas measures of first importance, and therefore give some relief from the monotonous conditions of the past few years. Birmingham and Salford Bills were then instanced; but among the early notices of Bills dealt with this week is another which will arrest the attention of those who watch movements in the gas industry. Territorial expansion of gas undertakings and consolidation of concerns by amalgamation are means that, there are signs on all hands, are of current policy in the industry in producing new opportunity and manufacturing and general commercial economies. Several companies have of late years been absorbing undertakings operating on their borders—some of them substantial concerns, and some of small order. Instancing this, are the amalgamations with the Gaslight and Coke Company; those, a few years ago, with the Croydon Gas Company; the consolidation quite recently of some gas companies in Essex; and several companies have united to themselves little neighbours within the immediate past. There have also been latterly several indications of undertakings stretching out their distributing arms into rural districts. A desire to early secure business relations with these places, and to have new breathing ground, is partly responsible for this; another reason for pushing outwards is that supply can, through the means of distant transmission of gas available to-day, be economically done.

The amalgamation which Parliament will be invited to consider in the next session, and which will, without question, be one of the central features of the parliamentary work for the gas industry, is embodied in the scheme which has been quietly maturing for some time past, whereby the South Suburban Gas Company will, all going well, unite to itself the Bromley and Crays Gas Company and the West Kent Gas Company. At one time communications were established between the South Suburban Company and the Croydon Company, and negotiations proceeded right up to a very recent date, with the object of connecting the latter Company with the project. This is not the moment to discuss the question of extensive consolidations of interests. It is not a question that can be determined by applying any general principles. Every scheme has its individual considerations; and among the considerations is the question of what is likely to happen in future. We need only say that the negotiations with Croydon proved abortive. As it is, the amalgamation of the Bromley and West Kent Gas Companies will make an extensive area—an area which is developing considerably as it recedes from London, in quarters residentially, and in quarters industrially; and the prospects are good in those parts of the territory for an advancing business on the cheaper gas supply that this particular fusion must inevitably produce. This is clearly an instance in which the advantages lie in the prospective development of opportunities rather than in any immediate effect; and looked at prospectively, there is engineering foresight in the scheme.

We will show what we mean, by reference to only two aspects, as they strike us, of this amalgamation proposal. If we take the last Board of Trade returns (ignoring the actual figures of to-day), just by way of illustration, we see that, as things then were, the total share and loan capital of the three undertakings, including premiums, amounted to approximately £1,367,000; and the sale of gas to, in round figures, 2000 millions. The aggregate capital as it then stood would represent about £680 per million; while the capital of the South Suburban Gas Company, including premiums, was equivalent to about £550 per million. Of course, differential prices will for the time being iron-out any disadvantage to the South Suburban area from this condition; but the South Suburban area will be a large partner in the economies of the future, through manufacturing concentration and business expansion. Take a map, and trace the district that will be combined if the amalgamations go through; and it is not difficult to see what an important advantage would be thrown open to this great gas-supply area through the (in times to come) improved water transit facilities for coal and residuals that would be brought into play, and through works concentration. We shall hear more about the case for amalgamation at the Wharncliffe meetings and as soon as the measure gets before Parliament, if nothing untoward happens to it. Looking at it from the prospective standpoint, it strikes us as being a statesmanlike and politic proposal, holding within it large possibilities for the districts concerned.

With regard to other important measures, the Birmingham Corporation give notice, in an "Omnibus" Bill, of their proposal to acquire additional lands for new gas-works. The Salford Corporation have determined to proceed with their measure for various gas-works purposes; but they have been unsuccessful in getting the outside authorities over to their side. These authorities gained something, in reference to the disposal of the gas profits, by the decision of the House of Lords in 1909, which led to the withdrawal of the Corporation Bill; and they are not now prepared to accept anything less. There is therefore a likelihood that they will be promoting a Joint Bill in which they will ask Parliament to give legislative ratification and form to the 1909 decision. The notice of the Standard Burner Joint Bill has been published; and fifteen Companies are the promoters.

Internal Influences of the Commercial Gas Association—Publicity Contributions.

IN last week's issue of the "JOURNAL" and again this week, an esteemed American correspondent has reviewed the proceedings at the annual conference of the American Commercial Gas Association; and in other columns (both last and this week) extracts have been printed from the papers presented and discussed on the occasion. In view of the organizing work now under way in connection with the British Commercial Gas Association, and in view, too, of the first annual conference of the latter to be held in Manchester next autumn, it has been considered by us that this account of the annual conference by our American friends will be not only of interest, but of service in showing the lines of work that their experience so far has directed them to, and enabled them to develop. We are starting on a new project at home—a project that all the circumstances of commercial position make particularly opportune—and it cannot be expected that perfection will come all at once. The Association has to cut its own way to perfection of operation, and to development of results. The one will succeed the other. We are, the more the inherent possibilities of such an organization are considered, impressed by them; and more especially as we examine them in the light of what our friends are doing in the United States. They have worked to make, and they have made, the Commercial Gas Association "a power in the gas-manufacturing and gas-selling "world." These are the words of the President of the Association (Mr. Clare N. Stannard, of Denver); and they are true. In some respects, the Association is constituted in regard to membership on lines different from our own. But how rapid has been its development, how rapid the appreciation of the opportunities it affords, under the changed circumstances of the enlargement of the number of purposes to which gas is applied, is shown by a membership already standing at the extraordinary figure of (approximately) 3000. It is a national gas organization, with national aims; and it is the strongest gas organization in membership not only in America, but in the world, and yet almost the youngest.

Why is this? The answer is that it supplies a need—a

need of the times. Dr. W. C. Unwin, in his Presidential Address to the Institution of Civil Engineers, the other day, was telling us that the engineer is not now solely concerned in engineering problems, but has to be familiar with, and has to cope with, economic, legal, and commercial problems. Never were truer words spoken. They apply to the gas industry, as well as to all other technical-commercial industries in which engineering has an important part in the economic productive results which assist in fixing the place of the product in the outer commercial world. Not only the gas engineer, but in the gas industry all the officers and members of staffs who deal with the trading work, have to-day to meet in the applications of the commodity a chain of heterogeneous and diverse conditions to which the old order of things does not bear the faintest resemblance. Individually in this country the chief officers and departmental officials have for most part, we hope and believe, kept themselves abreast of the changes in condition and requirement. But, excepting through the commercial sections of the District Associations (whose actions and opportunities are restricted, and are not universally recognized), there have been no steps taken of a character commensurate with the importance of the general position for conference, and for the improvement of the knowledge of the selling staffs. We foresee the new Association, with sagacious direction, becoming a "power in the gas-selling world" of this country, as is the Commercial Gas Association of the United States, apart from its original purposes—the advertising of, and the education of the public in, the modern uses of gas, and the protection of common interests against misrepresentation. The conferences will give us an educational platform within the industry itself. Has the gas industry properly appreciated what scope for internal work Objects "D," "E," and "F" in the constitution of the new British organization afford. Let us quote them—

> (D) To enable persons who are, or have been engaged in the conduct of gas undertakings or in industries connected with the gas industry to meet and to correspond; and to facilitate the interchange of information and of ideas respecting methods for the commercial development of the industry.
>
> (E) To invite from the members and others communications relating to the commercial aspects of the industry.
>
> (F) To develop and improve the commercial methods of those engaged in the industry.

We can see unlimited work here; we can see, too, many gas undertakings that are deliberately shutting themselves outside these opportunities for conference who later on will desire to participate. What is provided for there is what has long been wanted. What has now to be done is to make the best use of it.

Papers and discussions reflecting experiences, methods, deficiencies, needs, and much else, will naturally be the main part in the conferences of all who are members of the British Commercial Gas Association, and who are concerned in trading with the industry's staple product—of course, never losing sight of the predominant purpose of publicity. These papers and discussions, as are those in the American Association, will be of considerable educational value. Our friends in the States, through their organization, go beyond papers and discussions. Their educational work extends to the sphere of actual gas salesmanship. Let us refer to one line of operation. A correspondence course in gas salesmanship has been established; and it inaugurates its work with 725 members. Such work, as the President truly says, "marks a new era in the history of the gas commercial "world." We congratulate our friends on their initiative, pluck, and perseverance in attacking co-operatively what all agree to be a need, but to the meeting of which few prior to the establishment of the organization gave any very serious thought. Other work bearing upon gas sales is referred to Committees who each make a special study of the branch assigned to them. The Commercial Committee for example send out literature and instruction for pure food shows and gas kitchen and new business campaigns. The work is, we understand, to be specialized still further. One representative of the Association has been lecturing before stewards and *chefs* upon the wasteful use of gas in hotels, retaurants, and clubs, impressing upon them the importance of economy and of co-operation with the local gas authority. A Commercial Gas Association can obtain recognition by other societies where individuals cannot. By their recent conference, the Commercial Gas Association have illustrated the scope there is for work, apart from publicity, for a Commercial Gas Association in this country.

But on the point of publicity, the members of the American Association have a scheme before them for co operative advertising in trade and public papers of all descriptions. They believe in the commercial influence of the readers of trade papers; and our own Commercial Gas Association, in their publicity work, must not overlook the professional and trade papers that can help in promoting through their readers the use of gas for any purpose. The principal point of interest, however, in view of discussion in this country, is as to the ideas of our American friends on the subject of financial support of the work of publicity. It is suggested that subscriptions should be at the rate of 1 mill per 1000 cubic feet, which would represent $250,000 a year at the present volume of sale by the undertakings concerned. One mill is the one-thousandth part of a dollar; and therefore the proposal is that the rate of contribution shall be equivalent to 4s. 2d. per million cubic feet, which would produce upwards of £52,000 a year. Look on this picture, and then on the one over which there has been so much contention at home. As we have said before, if the promoters of the British Commercial Gas Association had asked for a contribution of 0·03d. per 1000 cubic feet, the absurd smallness of the request would have been a matter for humorous remark rather than serious discussion as to "excessiveness" of the demand. The 0·03d. represents the 2s. 6d. per million cubic feet sought, as against the 4s. 2d. per million proposed in America. We are indebted to the American Commercial Gas Association for the suggestiveness of their recent conference, which will be very useful under our own present position of having to mould the future work of the British Commercial Gas Association.

Science of Illumination—Important Movements.

THAT peculiarly active organization, the Illuminating Engineering Society, held its first meeting for the session last Friday; but the technical subject that was under discussion—"Motor Car Headlights"—was not one in which the gas industry is deeply concerned, though individually many of its officials are. There was, however, a summary of progress during the vacation presented by Mr. Leon Gaster, the Hon. Secretary; and this adds to the indications that the spirit of the times leans more and more to scientific illumination, and that both the gas and electrical industries will be forced to mend the part of their ways that shows a large amount of custom in method. For example, in the piping of houses for gas, builders have a way of locating the points of lighting, after the manner of their forefathers, without much consideration as to whether the arrangement constitutes the best for the purposes to which rooms are put. Electricians, too, are still guilty of placing their lights of high intrinsic brilliance in a fashion that vexes and harms the eye. All such defects are going to be ruled-out by the study of scientific illumination. The subject is being studied with increased vigilance. The summary of progress to which we have referred informs us that Committees have been appointed by the Society to consider the subject of school and library lighting; and on them the gas industry is represented. A street lighting specification has not yet issued from the labours of the Committee composed of members of the Institutions of Gas and Electrical Engineers, the Association of County and Municipal Engineers, and the Illuminating Engineering Society; and, after the information collected from lighting experts abroad by the "Illu-"minating Engineer," and reproduced in part in our columns a few months since, we have some doubt as to any generally acceptable and applicable specification being evolved. However, a good deal of data has been collected; and we must be patient for the outcome.

Allusion is made in the summary of progress to the appointment by the French Government of a Committee of oculists, physiologists, engineers, and factory inspectors to inquire into the hygienic aspects of workshop lighting. The reference to the Committee includes the framing of standards of illumination for industrial purposes, of simple illumination rules, inquiry into the nature and causes of defects of vision and their relation to lighting conditions, the measurement of illumination, &c. It is hoped by the votaries of scientific illumination that other countries will follow the lead of France; but had we not better wait, before urging things forward at too fast a pace, to ascertain the results and effects of the French inquiry. It has been suggested to

the powers that be in this country that factory inspectors should be vested with authority to require adequate illumination; and it is understood that the Home Office is now giving this matter careful consideration, and has arranged for tests to be made, and evidence collected on the point. Care is requisite in this matter. We should be very loth to give to factory inspectors the power of determining what is adequate illumination for any purpose without everything was properly and fairly—we emphasize "fairly"—defined for them, with a margin within which to exercise commonsense. We have cause to say this. There is the absurd prescription as to the very low limit of carbon dioxide—12 parts in 10,000!—in the air of factories. It is almost a wonder, with this prescription in existence, that the employees dare to breathe, lest an inspector should happen in, take a sample of the air, and find a slight infraction of the extraordinary and unnecessary limit, and make the employers suffer the consequences. This is a matter we dealt with in the "JOURNAL" for June 27 last (p. 984). If bureaucratic regulation is going to descend to the absurd in the matter of illumination, it would be just as well that it should be left alone.

A further point of interest is that, at the International Congress of Applied Electricity at Turin, the British Illuminating Engineering Society were requested to take the initiative in a movement for the appointment of an International Commission in order to study all systems of lighting, and technical problems in connection therewith. This is a big order; and International Commissions, as a rule, are cumbrous things for such a purpose as this. We do not see there is anything to be gained in the end by forcing the speed at which questions of illumination are being dealt with already by the Illuminating Engineering Societies. However, if there is to be an International Commission on the subject, it is just as well that the reins should be in the hands of a composite body such as the Illuminating Engineering Society of this country.

Another matter that is referred to is the work now being done, under the auspices of the London County Council Education Department, at the Regent Street and Battersea Polytechnics and the Northampton Institute, in the nature of courses of lectures on illumination subjects. The Regent Street course, it is understood, is particularly well patronized by students. The lectures are in the hands of specialists in each branch of lighting by the different agents; and one of the controlling regulations—for which it is believed Mr. Gaster has to be thanked—is that each lecturer shall confine himself to his own subject, and not intrude upon the domain of his colleagues, so as to introduce controversial subjects. Illuminating engineering, or the study of the science and art of illumination, is supposed to be far above the controversies of commercial rivalry.

Water-Gas Condensation.

THE literature of condensation in gas manufacture is extensive; but it mostly refers to the subject in relation to coal gas. The fact is referred to by Mr. L. E. Worthing, in a paper read at the meeting of the American Gas Institute; and therefore he has broken through the bounds of prior consideration of the subject before a technical gas body, and has specially discussed it in relation to water gas. If through a fresh and cheap mode of water-gas condensation, greater efficiency and economy can be secured subsequent to the generating plant, then it is worth hearing about. Such a process the author of the paper brings before us; and it is one that has been devised by Mr. H. L. Doherty, whom the members of the Institution of Gas Engineers had the pleasure of welcoming in Glasgow last June. One objection that Mr. Doherty found to the water-gas condensing systems hitherto in vogue was that they admitted of a state of equilibrium of tension between the gas and the condensates, and, in consequence, there was loss of part of the valuable high-tension vapours, and this meant a depreciation of candle power. In other ways, too, he found the old methods were uneconomical. The whole argument, founded on basic principles, which causes an indictment of the old methods, is to be found in Mr. Worthing's paper.

Mr. Doherty conceived the idea that the system wanted was one allowing as short time-contact as possible between the gas and the condensate, or, preferably, complete removal of the condensate as early as possible. His washer-cooler for water gas (it is also applicable to coal gas) was the result. In this an ascending current of gas meets a descending current of sprayed water. By this means, the temperature of the gas is promptly reduced, the products of condensation are washed out, and are mechanically carried away. Thus the condensate is removed before it has an opportunity to come into equilibrium of tension with the gas. The structural features of the apparatus appear to be very simple; and, among the economies, are found these: Little ground space is necessary for it; and the water required is a relatively small fraction of that needed by tubular water-cooled condensers. The tar and heavy oils are removed at a much higher temperature than in the ordinary operation; and one good result of this is experienced in the purifier-boxes. The caking through oil and tar of the material in water-gas purifiers is one of the unkind, but comparatively small, penalties attaching to recourse to the conveniences of carburetted water-gas plant. The troubles occasioned through depreciation of the activity of the purifying material, however, have been largely avoided at the works of the Detroit City Gas Company by the adoption of Mr. Doherty's water-cooler. The percentage of oil and tar present in the purifying material through its use is, it is found, less than one-sixth of the percentage present under the old system of operation. This being so, anyone with experience in carburetted water-gas manufacture will appreciate what the improvement means in the matters of more effective purification, ease of revivification, and longer life of material. It should also contribute to better oil results, through the lower compensation to be made for candle-power depreciation in the processes subsequent to production.

Gas treated by the new apparatus, it is seen from the paper, has been subject to drastic tests, with commendatory results for the apparatus. The author omits details as to costs; and these have a bearing on the question of relative economy, though no doubts are raised by the paper as to the superiority of the washer-cooler in this respect. But there is a liking for the examination of actual cost experiences, as these go far, by supplementing information as to working efficacy, in persuading to adoption or trial. So far, there is only the paper before us upon which to form judgment; but its terms are such that we shall be interested in hearing more.

Coal Miners and a Minimum Wage.

TENSION in regard to the prospect of a strike of the coal miners in the depths of winter has been relieved by the decision arrived at last Wednesday, at the conference of delegates representing between 600,000 and 700,000 underground workers who are members of the Miners' Federation of Great Britain. The resolution enables the continuation of negotiations with the coal owners, who have conceded the principle of a minimum wage for all men and boys working underground. The men of Durham, Northumberland, and South Wales were (we do not suppose entirely, but speaking generally) strongly opposed to any conciliatory attitude being adopted, and were in favour of forcing the pace by at once taking a ballot of the miners throughout the kingdom on the question of a national coal strike. The moderates and those pacifically inclined, however, by a substantial majority, determined on the wise course which the coal owners—prudently or not in the long run cannot as yet be said—opened up by accepting the principle of the minimum wage. Under the circumstances, the claims of the men in the various districts regarding a minimum wage are to be formulated; the English Coal Conciliation Board are to meet on Dec. 6 to hear the results of the masters' deliberations; and the Miners' Federation will assemble again on Dec. 20 to consider the issue of the present negotiations. Thus we have a certain respite from hostilities in the coalfields this side of Christmas; and what will happen afterwards will depend upon whether, in the different districts, the masters and men can agree upon the terms of a minimum wage, and, if they cannot, whether the then inevitable ballot of the miners will declare in favour or otherwise of a national strike. The position to-day must therefore be regarded as only temporary; but, in view of the present conciliatory attitude of the masters and of a majority of the men, it is hopeful.

The acceptance of the principle of a minimum wage by the coal owners is a matter that is big with importance for all industries. About the principle, there is something that is abstract and intangible; and there is a good deal of perplexity as to what are the elementary considerations upon which to give the minimum wage concrete form in the various districts. If the principle is once recognized and

established in the coal industry, it is certain to spread to other industries. A minimum wage for all workers is one plank in the platform of every extreme Socialist. But the very idea of a fixed minimum wage is distinctly repugnant to the fundamental controlling principle in commerce of supply and demand. Whatever the state of the markets, the minimum wage will be a fixed factor; there can be no sliding-scale in connection with wages and the market prices of the produce that will operate below the minimum wage. There it will be; and there it will remain—for a period. The coal-masters, if the negotiations result in the establishing of the minimum wage in the different districts, must see to it that the period before there can be any claim to revision is a long one, so that conditions in regard to labour may be ensured that may be regarded as normal over a considerable period. But of this one may rest satisfied, that the effort of the men will be directed to raising the level of the minimum wage on the expiration of every period to which agreement refers. If the principle is established in the coal-fields, it will, of course, mean that it will put another fixed item in the composition of coal costs; and the buyer may be sure that whatever are the effects of this, he will be the sufferer. Still buyers would be pleased to pay a price a little higher than would otherwise be the current rates if this would purchase certainty, although objecting to the periodical endeavour to raise the level of the minimum wage.

The "Daily Telegraph" Engineering Correspondent's Reply.

The reply of the "Engineering Correspondent" of the "Daily Telegraph" to the criticisms in our columns of the articles he contributed to our morning contemporary appears in this issue. In connection with it, we would call our readers' attention to the editorial note at the end of his deliverance. This explains that the reason an editorial comment on the article does not appear this week is solely that the "Engineering Correspondent" himself stipulated that he should have a week's run free of criticism. Our comment will consequently be published next week. Those of our readers who desire to criticize the article appearing this week, or to give any information to the writer of it, through our columns, will find the previous articles and correspondence in the "JOURNAL" of Oct. 10 (p. 93), Oct. 17 (p. 167), Oct. 24 (p. 253), Oct. 31 (p. 326). One other point. The "Engineering Correspondent" has chosen to continue to screen himself behind his *nom de plume*. Any of our readers who, for private or official motives, prefer not to divulge their identity in print have the same liberty, providing that names and addresses are confided to the Editor.

By Way of Provisional Order.

The review of the Board of Trade on the Provisional Orders of the present session reflects the fact that this mode of obtaining legislative powers is not dealt with perfunctorily. The Orders are scrutinized very systematically; and it will be observed that amendments are made pretty freely, but not autocratically, if cause is shown, or the Board see fit. Some time since the Board, it will be remembered, were pointing to the attractions of Provisional Orders as a cheap method of securing legislative powers. But anyone reading the report in our "Parliamentary Intelligence" will be a little suspicious of the correctness, excepting under certain conditions, of this presentment of the case. It depends very much upon the conditions whether the process is cheap or dear. If an Order is not opposed, then the method of securing powers will be cheap; but supposing there is opposition before the Board, and then, on the Confirmation Bill being submitted to Parliament, in both Houses, the promoters will be justified in considering that it would have been just as well to have started and ended in Parliament, than to have had the trouble and expense of inquiry before the Board. There is the Uxbridge Gas Company's Order as an example of this. Here a County Council pursued the Company right from the Board of Trade through Parliament to obtain the right to use a 15-ton steam-roller without any liability for damage to pipes. Fortunately they were unsuccessful. It therefore depends on circumstances whether it is likely to be cheaper or dearer to commence with the Board of Trade; and, of course, at the initial stages of a promotion, it is oft-times impossible to say what amount of opposition is likely to be encountered. There are several points of interest about the present report on the Provisional Orders of the session. For example, in the Cannock Order, we see the Board cut out part of the proposed extension of limits where it was thought the promoters were unlikely for years to carry their mains, while other gas authorities might be willing at an earlier date to step in and supply. We do not believe in closing areas to gas supply by conferring rights on applicants where they are not likely to be exercised. Such rights should only have a limited existence, so as to come up for review again, or to liberate within a reasonable period the areas concerned for the possible enterprise of others. It is noticed that the Longford Gas Company failed to secure 12 candles as their standard of illuminating power, as did the Bury Corporation in 1909, and the Middlesbrough Corporation in 1910. They have to be content with the general rule of 14 candles. The Preston Order is mentioned, in which a capital redemption fund to the amount of £100,000 was bestowed upon the Company without request; but this consideration and a reduction of the standard illuminating power from 18 to 14 candles carried with it a recession of the standard price. But this is a case in which the standard price has had no bearing on the dividends paid, so that no one feels a penny the worse.

Mantle Posters.

In these days when on the hoardings the electric lamp makers are extensively advertising the virtues of metallic filament lamps, with an occasional lapse from the truth as to the relation of such lamps to gas-burners in the matter of cost to the consumer—omitting at the same time to mention the price of current and of gas, or whether the statement refers to the South Sea Islands or London—it strikes us as being somewhat peculiar that the gas mantle makers for the most part continue to display posters of upright mantles; and it is rarely on the hoardings that one comes across a poster showing the inverted mantle. This we regard as a pity, as inverted burners, from more than one point of view, are distinctly stronger competitors of electric lamps than the upright form. With the inverted mantle business extending at such a rapid rate (though fewer mantles per burner are required with the inverted burner for renewal purposes than with the upright type), it is singular that the posters of the mantle manufacturers have not been revised, in order to give at least an equal, if not a greater, prominence to the inverted mantle. We take it that it is a question of expense in the preparation of the posters that induces adherence to the old forms showing only upright mantles. However, perhaps some of the makers will consider that the time for a change has now arrived.

Annual Assessment of Profit and Loss.

Setting himself to supply an answer to the question whether the annual assessment of industrial profit and loss can be raised to an exact science, Mr. P. D. Leake, F.C.A., in a paper read to the Institute of Directors, urged that, although present methods of assessing annual profits lack anything like scientific accuracy, they can be easily improved and advanced by giving attention to systematic accounting for capital outlay as it expires annually. All capital outlay on wasting assets, including industrial plant and machinery, he argued, consists of payments made in advance on revenue account; but it is a common practice to charge expenditure made in advance on revenue account, which cannot be debited to the revenue account of the year when the payments are made, to some account representing capital outlay, and there to leave it, unobserved, and with details lost to mind, subject only to reduction by irregular allocations of sums out of revenue, "unhappily called depreciation," to answer requirements of really unknown extent. The result is that the accounting records relating to capital outlay speedily become a confused mass of meaningless figures. No attempt, said Mr. Leake, is made to keep track of the cost of each class of plant, and see that this cost, which is incurred solely on revenue account, is duly charged to revenue over the period which receives the benefit of the service, or the usefulness, of each particular class of plant during its efficient life. The author suggested that, in place of the present neglectful treatment of industrial plant, and of the accounting records of the capital outlay which purports to represent it, both should receive continuous and systematic attention, and provision should be made for the regular observation and record of the behaviour of, and the changing conditions affecting, each class of industrial plant representing capital outlay; the use of suitable accounting equipment, capable of enabling the results of such observation and record to be forthwith reflected in the annual accounts; and the adoption of a settled and continuous

financial policy, under which each year's revenue account shall be charged with a regularly measured sum, based on such observation and record, to answer capital outlay expired during the year. Systematic observation of industrial plant is needed to ascertain that, on the existing registered estimates, a sufficient sum is being taken out of the annual revenue receipts to replace the balance of cost outstanding by the end of the efficient life of the plant according to the latest estimate. Regular and close comparison between the accounts of capital outlay and the wasting assets which should represent that capital outlay, said the author, will enable coming changes to be intelligently prepared for; and, further, it will enable industrial profit and loss to be accurately assessed as between one year and another—"thereby removing one great difficulty in the way of the general adoption of profit-sharing co-partnership between Capital and Labour."

Trade Disputes Act Reform.

It is only a few weeks since an influentially signed memorial to the Prime Minister was drawn up by the Employers' Parliamentary Council, calling attention to the grave evils which have arisen in consequence of the Trade Disputes Act, 1906, and to the present combination of labour unions for the purpose of promoting national strikes fraught with incalculable loss and immense suffering to the community. Now the matter has been carried a step further. At a meeting held in London last week, a new Association was formed, called the Trade Disputes Act Reform League; and of this body Lord Claud Hamilton, M.P., the Chairman of the Great Eastern Railway Company, has accepted the Presidency—with Lord Joicey and Lord Monkswell as Vice-Presidents. The reasons for the calling into existence of the League have been publicly set forth by Lord Claud Hamilton, who points out that many events which occurred during the recent labour troubles clearly show that the Trade Disputes Act, which has conferred upon the system of labour unionism a dangerous power, should not be allowed—at any rate in its present form—to continue on the Statute-book. Labour unions, he remarks, no longer confine their activities to the particular sections of industry with which they are concerned, but are endeavouring to federate into one body, which, if the present law stands, would be able to paralyze the trade, communications, and food supply of the country, and threaten our national existence. It is admitted that employers of labour are becoming alive to the situation, and that the different Employers' Associations in course of formation are well advised. But it is urged that until the Trade Disputes Act is amended, employers' federations can do little to avert the distress to their workmen, the general public, and themselves now caused at the will of agitators. The new League will have as its principal aim "to convince Parliament that a mistaken effort of legislation, which threatens the safety of life, liberty, and property, must be amended;" and it will carry on a "continuous educational campaign with regard to the calamity which threatens the future of the social and industrial life of these islands." The promoters of the League have set themselves a serious task; but the President is no doubt justified in feeling that the movement will commend itself to law-abiding citizens of all shades of political opinion. The assistance is asked of those who are willing to give financial or active support to the work.

Parliamentary Authorization to Benefit Funds.

Joint promotions for common purposes are the order of the day. A little promotion comes upon the scene of parliamentary affairs as something of a novelty. It is promoted jointly by the Brighton and Hove Gas Company, the East Cowes Company, the Lea Bridge Company, the Maidenhead Company, the North Middlesex Company, the St. Albans Company, and the Southgate and District Company. When we consider the directorial interests of the Chairman of the Brighton and Hove Gas Company (Mr. A. M. Paddon, Barrister-at-Law, M.Inst.C.E.), we have a fair amount of confidence in hazarding a guess as to one of the principal influences that has brought about this particular promotion. Frankly, however, it has to be confessed we do not quite know what to make out of the proposal. It is a simply worded measure, of few clauses; and, in brief, it is to empower the companies named to establish a fund for the purpose of granting pensions and other allowances and payments and benefits to their servants. Many companies make such provision under schemes to which generally the men contribute; and this without any special enactment. If this is not legal, then they may as well know it. But the question has never been seriously raised, so far as we are aware—at any rate, in connection with statutory companies. It will be interesting to see how the parliamentary authorities will regard this development, though they cannot well object to revenue appropriations for such a purpose when they rightly and willingly agree to co-partnership schemes.

Further to What is Proposed.

It is proposed by the measure that authority shall be given to appropriate out of revenue in respect of any year, as part of the expenditure on revenue account, any sum not exceeding ½d. per 1000 cubic feet of gas supplied by the company during the year, which appropriation is to be placed to a fund to be called the "Benefit Fund." Provision is made for the limitation, and disposal, of the fund. Now if this authority is given, and the company concerned go a step further and introduce a scheme involving contributions by their servants, the scheme is not to come into operation until the company shall in respect of the scheme have been duly registered under the Friendly Societies Act, 1896. It is not much use discussing the matter until there is some knowledge as to what has prompted the move. Perhaps someone will enlighten the gas industry through our columns, for the promotion and proposal are interesting, and may have an importance of which it might be well to have cognizance.

Work of the Labour Exchanges.

The first Board of Trade Labour Exchanges (to the number of 82) were opened in February, 1910; and on Jan. 1 of this year a new system of counting applications was put into force, and a separate register was introduced for certain casual employments. Thus there are not yet available any uniform figures for a period of twelve months. The Board of Trade have, however, issued a statistical statement covering the nine months ending Sept. 29 last, so as to include the results of the working of the exchanges since the figures have been calculated on the revised basis. In the time named, it may be remarked, the number of exchanges open in the United Kingdom increased from 148 to 239. According to the general register, the applications for employment received during the nine months numbered 1,197,843, of which 286,894 were by women. The vacancies notified in this period totalled 414,138; and those filled, 324,270. In the statistics, the trades are grouped in accordance with the classification employed for the tabulation of the results of the Census of England and Wales, 1901. One section refers to gas, water, and electricity supply and sanitary service. In this division, it is stated that the applications for employment numbered 9981; the vacancies notified, 4289; and the vacancies filled, 3670. Taking all the nine months separately, the highest numbers of applications were in March and September; and the vacancies notified and filled were also most numerous in these months. The separate register introduced at the beginning of the year deals with certain employments of a peculiarly casual nature—such as dock labourers, sandwichmen, bill distributors, and charwomen.

"Mechanical World" Pocket Diary for 1912.—We have received from the publishers, Messrs. Emmott and Co., Limited, of Manchester and London, "The 'Mechanical World' Pocket Diary and Year-Book for 1912." This is the twenty-fifth issue, and it contains not only the usual collection of useful engineering notes, rules, tables, and data, but many new and interesting features. The number of illustrations has been again increased, and the whole work thoroughly revised. The price of the book, cloth bound, is 6d. net.

Escape of Gas from Coal.—The "Journal of the Franklin Institute" summarizes a paper by Messrs. H. C. Porter and F. K. Ovitz to the United States Bureau of Mines. They say that laboratory experiments made with certain American bituminous and semi-bituminous coals from dangerous mines showed that these coals liberate methane not only during mining but also for a long period afterwards. Taking the volume of coal as unity, about ¼ volume of methane escaped during crushing and ½ to 1½ volumes on continued exposure to air. The escape of methane was rapid at first, but ceased after three to eighteen months. The reduction of the calorific value of the coal due to the loss of methane was very small. Such coals absorbed oxygen over a prolonged period at varying rates, without an equivalent formation of carbon dioxide. The well-known influence of atmospheric pressure on the liberation of inflammable gases in mines is probably due to the pressure of reservoirs of these gases in the stratified rocks, and not to the presence of gases in the substance of the coal itself.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 556.)

THE Stock Exchange has had another quiet and rather uninteresting week. Buyers outside were few and far between, enterprise was almost at a standstill, and markets on the whole wore an air of languor. Home Rails had a fairly good time, though at the close of the week they were not at their strongest. Conversely, Americans, after some tribulation, had a considerable recovery towards the close. But Government issues and some other of the gilt-edged class were dull and heavy, and Consols felt the want of support. Business in general was very quiet all through the week. The opening day inclined towards inaction, and, except in one or two things, there was little doing. Government stocks were not strong, and Consols were a shade easier for the account. Rails were much cheered by the decision of the Crewe men, and prices advanced. Foreign and American were dull. On Tuesday, business continued to be limited; but the tendency was steadier. Consols were unchanged. Rails, after a little hesitation, made a good step forward. Wednesday was a heavy day, with sluggish markets and a flat tone generally. Consols fell $\frac{1}{8}$, Rails swayed about in an uncertain mood, Americans shrank, and Foreign were far from strong. Languor continued on Thursday; and most movements were downward, though not of magnitude. Consols fell $\frac{1}{8}$, Rails were irregular, and Americans moved unevenly. Friday's tone was not cheerful. Consols did not move; but Rails were lowered by sales. Americans were about the best market. Saturday was very quiet; but the tone was decidedly improved, though Rails were not among the gainers. Consols closed at $78\frac{1}{4}$-$\frac{1}{2}$—a loss of $\frac{1}{8}$ in the week. The Money Market had an abundant supply, and rates both for short loans and for discount eased away steadily. Business in the Gas Market showed a paucity; and transactions were almost confined to the few issues which are always foremost in activity. Changes in quotation were few and slight, but entirely satisfactory to holders. In Gaslight and Coke issues, the ordinary had a moderate share of the business, and remained very steady at from $104\frac{1}{4}$ to $105\frac{1}{4}$. In the secured issues, the maximum realized from $85\frac{5}{8}$ to $86\frac{1}{4}$, the preference from $103\frac{1}{8}$ to 104, and the debenture from $80\frac{3}{4}$ to 82. In South Metropolitan, there were a few transactions ranging from $116\frac{1}{2}$ to 117. In Commercials, dealings in the 4 per cent. were marked at from $110\frac{3}{8}$ to $111\frac{1}{2}$, and one in the $3\frac{1}{2}$ per cent. at $106\frac{1}{2}$. Among the Suburban and Provincial group, Alliance and Dublin changed hands at $79\frac{1}{2}$, Brentford old at 259 and 261, and South Suburban at $120\frac{1}{2}$ and 121. On the local Exchange, Newcastle was marked at $101\frac{1}{2}$. In the Continental companies, Imperial was more than usually active, and realized from $183\frac{1}{2}$ to 185, European was done at $19\frac{3}{4}$ and 20 (a rise of $\frac{1}{4}$), and Tuscan marked 9. Among the undertakings of the remoter world, Bombay changed hands at $6\frac{1}{2}$, Cape Town at $2\frac{7}{8}$, ditto preference at $4\frac{3}{8}$, Primitiva at $7\frac{7}{16}$ to $7\frac{1}{2}$, ditto preference at $5\frac{1}{4}$ to $5\frac{5}{16}$, ditto debenture at $97\frac{3}{4}$ to 99, San Paulo at $10\frac{9}{16}$ to $10\frac{7}{8}$ (a rise of $\frac{1}{4}$), and ditto preference at $11\frac{7}{8}$.

ELECTRICITY SUPPLY MEMORANDA.

Organization and Supervision of the Sales Department—Value of Prompt Attention—Defect of Electric Kitchen Appliances—City Street Lighting—The Poor Man and Electricity Tariffs—With 1931 in View.

THOROUGH organization in the sales department is an essential thing nowadays; and a further essential is to see that inspectors and canvassers are prompt in their attention to consumers, and do not put off to the morrow what can be done to-day. Procrastination is said to be the thief of time; and procrastination sometimes means the immediate loss of a customer, or may sow the seeds of a discontent that will mean his ultimate loss. We know the case of a householder not twenty miles from London who, on changing his residence, communicated with the gas company in the district in regard to a gas-cooker; and about three weeks elapsed before he received attention. The delay on the part of the gas company, the apparent indifference as to whether the householder had a gas-cooker or not, worked him up to such a pitch of resentment at the neglect, that, if an electricity cooker canvasser had dropped in in the interval, he might have been tempted, without much thought as to the future, to have had one installed. From other districts we have heard of complaints of leisurely attention to requirements. We cannot think this is due to the chief offices; but rather to some laxity on the part of members of outdoor staffs. If this be so, it points to a want of proper organization, and a check upon the proceedings of subordinates. Gas companies have a reputation among electrical people for smartness and prompt attention; but this reputation is not sustained in all quarters.

"Meteor" of the "Electrical Times" describes an incident that stands to the credit of the canvasser of a gas company for commendable push. The head of a family leased a house in a London suburb just recently. The premises were wired for sixty points; and the new tenant desired to know which of them were suitable for heating. He wrote to the municipal electricity department, asking that someone should inspect the wiring, and let him know if the installation would be equal to his needs. A reply was received, stating that the department did not undertake any work inside the premises of clients; but left all this sort of thing to the contractors. The householder felt somewhat nettled; and while in this frame of mind, a visitor was duly announced. Let "Meteor" continue the narrative in his own style: "This proved to be a well-groomed, well-instructed, and well-mannered representative of the gas company, who had called in order to place the resources of the gas world at the disposal of our friend. He had the tact not to press the replacement of electric light by gas. He saw the client was not to be shaken on that point; and he was quite content to let the lighting go so long as he got the heating and cooking business. Our friend asks if it is any wonder electric heating and cooking do not make greater headway when electric supply authorities throw their clients into the arms of the gas people in this way." We do not accept as gospel everything that "Meteor" says; but, in this instance, he is evidently pained over the lack of enterprise on the part of the municipal electricity undertaking manager who he has put into a screened pillory, and the narrative bears a genuine ring about it. It enforces the point as to not losing opportunity, and of the wisdom of being an early bird. We know the "Memoranda" are read by many members of staffs of outdoor departments of gas undertakings; and though not nearly so much is said in these two paragraphs as might be, the suggestion and moral may have some suasive effect where there is room for improvement.

We are hearing various reports about householders' experience with electric kitchen appliances. Like most novelties, they are sure to get a little innings; and there is certain to be some affection for them in the beginning, and a circulation of good reports. On adopting anything new, and praising it up to one's friends, it requires some amount of courage to afterwards admit failure; but with these electrical goods they are strongly susceptible to failure in one or more ways. One experiences difficulty with servants, who do not take kindly to the electrical fads of masters or mistresses. Cooks find that the definite temperatures obtained by the use of different plugs are not so convenient in their responsible work as the range of temperatures to any degree up to the maximum point of the gas supply to be secured by the simple process of turning a gas-tap. Others again are already discovering that there is a vast difference between new electrical kitchen appliances and those aged by a few weeks. In other places, too, the grave disadvantage of relying upon electricity in the kitchen has been emphasized by interruptions in the supply of current. Where for boiling purposes, utensils are separate from the heating elements, a very brief use of the former by servants sends the bottoms out of truth, and trouble arises. And where, as in electric ovens and other kitchen apparatus, the heating elements form part of the structure, there is serious trouble and expense in store for the user. The writer of "Installation Topics" in the "Electrical Times" calls attention to this; and he deplores the absence of any provision in some of the apparatus for replacing or repairing the heating elements. In electric kettles, for example, one sees the heating element soldered inside a false bottom, like the contents of a sardine box; and there is in prospect here a job, or perhaps many jobs, for the makers, a loss of the use of the apparatus while under repair, and the cost of the carriage to and from the makers. When the heating elements in an electric cooker have run their course, or premature ill occurs, and there are no stand-by means of roasting or baking, the householder must go without—if he keeps the oven long enough in use for such a disaster to occur. "If electric cooking is to compete with gas," says the writer of the note before us, "the apparatus must be so simple to repair that any local electrician can put matters right on the spot." The users of gas ovens and appliances have a large amount of confidence in them, because (excepting cleansing, which is necessary with all cooking appliances whatever the source of heat) there is nothing that can get out of order; and the utensils necessary are of the kind that can be bought over the counter of any ironmonger's shop. We can put our hands upon electrical friends who are officers of electricity undertakings, who, when playfully twitted on their adherence to gas-ovens, while outside their habitations advocating their business specialities, broadly smile, and deftly shunt over to another subject. The twitting is not carried too far, as business with them is as good as other consumers; and every man has a right to privately please himself.

"Meteor" has an extremely rude way sometimes of referring to the highly successful appliances of the gas industry. He has been writing on the recommendation that the Corporation Streets Committee are proposing to make regarding the lighting of the City—that the two competitors be each given half the business. The meteoric one alludes to this as the only issue from the "impotence" of the Streets Committee to make a choice. This is not a particularly courteous way of expressing the position. A further example of the same sort of thing is found in the succeeding sentences, in which he says: "The lamps are to be centrally hung; the type of gas *monstrosity* being that already visible at the King William Street end of Cannon Street." That again is not courteous, and is not truth. Anger manifestly drove "Meteor's" pen along when inditing the paragraph. Nothing can satisfy him. When a gas company's tender is accepted for the whole of the street lighting in competition with an electric company, he is not pleased; when electricity is successful in getting "half the loaf," again he is not pleased. Nothing but the whole will satisfy him. After the report of the Continental deputation, he ought to be thankful that electricity got anything at all in the City, and the same in Holborn. The electricity companies are glad enough to obtain some of this business, though they know

that there is precious little, if anything, of the profit order in it for them, through having to compete with the economies of inverted gas lighting, both high and low pressure. He is also vexed with the Corporation Streets Committee talking of saving under the new contracts thousands of pounds per annum. He seems to think they ought to spend it on additional illumination. But, "Meteor," do be merciful to the ratepayers. Think of the many years the sum of £26 per annum for each of the archaic electric "monstrosities" that have cumbered the City streets has been flowing regularly into the coffers of the City Electric Supply Company. From the ratepayers' point of view, there has been shameful waste here; and it is time they had some advantage from the advances of illumination. Gas can certainly take credit for having forced open the door that has admitted of economy with increased efficiency.

The endeavour to get the occupants of cottages to become users of electricity for lighting is not being crowned with success; and is it surprising? The tenants cannot afford much, and what they can afford represents very little illumination. The result is (as we were showing by reference the other week to the fixed 6d. per week rate at Eccles) that there is not anything in these schemes for the electricity concerns. Scraping things down to the finest possible point in the way of installation and illumination, they cannot cover the whole of their expenses from the slender revenue. The Marylebone Borough Council have been trying a scheme of electric lighting in their John Street Dwellings, and already they have had to come down in their prices. But the tariff in this case is still shockingly heavy for people occupying such tenements, as will be seen by the following terms: "(*a*) 6d. per week per 25-candle power Osram lamp in living rooms; (*b*) alternative to (*a*) 5d. per week per 16-candle power Osram lamp; (*c*) 4d. per week per 25-candle power Osram lamp in bedrooms; (*d*) alternative to (*c*) 3d. per week per 16-candle power Osram lamp in bedrooms; (*e*) alternative to (*d*) 2d. per week per 8-candle power Osram lamp in bedrooms." We can see some of the working men to whom this scheme is offered scratching their heads vigorously over it, and in the result understanding just as much about it as some people do about Mr. Lloyd George's land valuation forms. It is a very curious thing that, with all their experience, electricity suppliers will not grasp the importance of tariffs that people can readily understand. They know how among the majority of electricity consumers the maximum demand system is detested; and they have learned, too, that the limit within which such systems as the "telephone" or "Norwich" can operate is very narrow. There are not many householders who can afford to put their hands in their pockets for a goodly lump sum as prepayment for something to be received over a long period, in addition to the payment at the end of the term of a further account for the units consumed. But with all the experience, electricians must complicate things; even in their charges they must be what they call scientific, or the charges will not be worthy a place in electrical trading. The good old British custom of a flat-rate with the goods measured or weighed is, among consumers, if not electricians, the most popular of all trading systems. It must be so. The prices from Marylebone for the dwelling-houses of the poor are, of course, flat-rates for different candle-power lamps; but the list of alternatives for different rooms will be a puzzle to the working man who is thinking that he would like his establishment lighted by this uneconomical method. The "Electrician," when referring to the subject of fixed prices, says: "We notice that in London new consumers are still being connected up in the streets where the system has been on trial a year or two." If our contemporary has no objection, we should like to cast our eyes on the same sources of information. If it has an objection, would it mind telling us how many tenants the Fixed Price Company in South London have secured; how many of them have severed their business relations with the Company; and how long the Company have been operating there?

The London County Council are making a survey, by the aid of the Finance Committee, of their position in relation to the electricity undertakings of the Metropolitan Borough Councils, in view of the fact that the County Council are the purchasing authority in twenty years' time under the Act passed in 1908. The Council have in the present a duty of importance to perform in regard to the municipal electricity undertakings, through the dual position which they occupy—they being also the authority who have to say "yea" or "nay" to applications for loans from the Borough Councils. Therefore it is a very proper thing that—the approximate average serviceable life of electrical plant being twenty years—the Council should consider applications for loans in relation to the purchase year of 1931—to see that there is no extravagance, and no useless waste of money in plant in excess of Metropolitan requirements. They have to consider the question of development mainly from the Metropolitan standpoint, and not from the parochial, though not ignoring the latter. It is not proposed yet to lay down any inflexible rule on the subject of loans; but the Council are maintaining the right to be fully satisfied on the question as to whether any proposal brought before them is the most economical under the circumstances. If a Borough Council refuse to disclose to the County Council full information when an application for a loan is made, then the Council will decline to grant it. They have done this in the case of the Bermondsey Borough Council, who applied for a loan of £18,563 for works extensions. It came to the knowledge of the County Council that two Electric Supply Companies had offered to supply the Borough Council with current at certain rates, in lieu of extending the plant of the latter; and the County Council claimed the right to know what the terms were that the Companies had offered. But the Bermondsey Council considered this a trespass upon their administration, and refused to give the information. The County Council have therefore declined the loan; and so we suppose there will now be an appeal to the Local Government Board under the London Government Act of 1899. What the County Council would like to see is, under the 1908 Act, more linking-up for mutual support between the electricity undertakings, so as to spread capital economy all over London. That is very sound and very right. Though what is improper in this regard would be the best possible thing for the gas undertakings as such, though not as ratepayers.

Personal.

Mr. J. Corrigan, the Manager of the Paignton Gas-Works, has been the recipient of a silver-plated fruit service and an illuminated address from the employees, on his leaving to take a similar appointment at Brixham. Mr. Flood, the Clerk to the Company, made the presentation, and paid a high tribute to the efficient manner in which Mr. Corrigan had discharged his duties. They were, he added, all sorry to lose him, and wished him every success. Mr. Corrigan suitably responded.

Obituary.

The death occurred recently of Mr. Lawrence W. Adamson, at the age of 82. For many years he was at the head of a Gateshead engineering works; and he was also at one time Chairman of the Newcastle-upon-Tyne Gas Company, which position he resigned in 1900.

We regret to learn that Mr. Francis Sutton, of Norwich, the venerable author of "Sutton's Volumetric Analysis" (a review of the tenth edition of which work appeared in the "Journal" for the 7th inst.), sustained last Saturday the loss of his wife, at the age of 78. Mr. and Mrs. Francis Sutton celebrated their golden wedding two years ago. Their eldest son, Mr. F. Napier Sutton, is the Inspector under the Alkali, &c., Works Act for the South-East District of England. Their second son, Mr. W. Lincolne Sutton, is Public Analyst for the City of Norwich and for Suffolk, and Gas Examiner for the Corporation of Norwich.

The Oil and Gas Regions in Texas.

We learn from the Director of the University Bureau of Economic Geology and Technology, of Austin, Texas (Mr. W. B. Phillips), that the Bureau has undertaken to make a careful examination of the oil and gas regions in Clay and Wichita Counties, on the Red River, north-west of Fort Worth. No published reports on this area have ever been made, as there is no Geological Survey in Texas; and it is only recently that funds could be provided by the University. There are now two recognized oil-fields in this region—Petrolia, in Clay County (sometimes known also as the Henrietta field), and Electra, in Wichita County. There is also in Clay County the largest natural gas field now known in Texas. In view of the promising nature of the oil and gas fields in these counties, and the almost total lack of information concerning the geology of the respective districts, the Bureau has undertaken to prepare a special bulletin on the subject, which will be for free distribution. It will, however, be several months before all the required data can be obtained and made ready for publication.

Presentation to Mr. Charles Wood.

At a recent meeting of the Yorkshire Commercial Section of the Manchester District Institution of Gas Engineers in Bradford, a silver salver, subscribed for by the members, was presented to the President, Mr. Charles Wood, F.C.S., Gas Engineer of the Bradford Corporation. It bore the following inscription: "Presented to Charles Wood, Esq., F.C.S., by the members of the Yorkshire Commercial Section of the Manchester District Institution of Gas Engineers, as a token of their appreciation of his services as President from its inception in March, 1903, and as a mark of their personal regard.—Nov. 2nd, 1911." The presentation was made by Mr. Robert Watson, of Doncaster, the President of the Manchester Institution, who said that the gift was but a slight recognition of the esteem which the members had for Mr. Wood, and was offered as an appreciation of his unfailing courtesy and the tact and ability with which he had conducted the meetings. Mr. Wood, in thanking the members, said no one was more surprised at the presentation than himself, as he had never expected anything, and did not feel that he deserved anything. He looked upon the Commercial Section not so much as an association as a family gathering of members of one profession, among whom there was no need of rivalry or competition; and anything he could do for his brother managers he was only too pleased to do.

In addition to the new Mayors associated with the gas industry noticed in the "Journal" last week, Mr. H. Robinson, the Mayor of Ossett, is Chairman of the Gas Committee of the Corporation; and the Mayors of Richmond (Yorks) and Sandwich—Mr. F. R. Whitton and Mr. D. Scott—fill a similar position.

THE SMOKE ABATEMENT EXHIBITION AT MANCHESTER.

Second Notice.

[By Our Manchester Correspondent.]

It seems likely that before the exhibition is closed down on Saturday, it will have achieved much, if not all, the promoters expected of it. The attendance of the public, and business people interested in the subject of smoke abatement, has been fairly satisfactory since the opening day; and if the educative effect of the exhibition is not as yet very pronounced in the orders placed, there is little doubt that it will lead to a much greater use of the modern appliances shown for the abolition of the smoke evil. The Gas Committee of the Manchester Corporation have done a great deal, by advertisement and otherwise, since the exhibition opened to popularize the use of gas-fires; and they are ably backed up by manufacturers in the exhibits at their respective stands of the latest models in this line, as well as other appliances for the use of gas for purposes of heating, cooking, and power.

A second visit to the exhibition confirms the statement made in the first notice, that the gas industry plays a leading part in the campaign of the Manchester and District Smoke Abatement Society, supported by the parent organization and the Society of British Industries. There seems a great deal of truth in the assertion that it is hard to convince the people of Lancashire as to the advantages of the gas-fire—more so than in the north and south. This is probably as much due to the cheapness of fuel as to an unfounded prejudice against this form of heating, and the innate conservatism characteristic of Lancashire men. However, the mistrust of the gas-fire is being gradually swept away; and to this end the exhibition is contributing a big share. The people are beginning to realize that, for cleanliness and comfort, modern gas-fires cannot be beaten; and as they can now be hired for less than a penny a week, gas committees and companies are bound to do an increasing business on this side of their respective undertakings.

During the week many gas engineers in Lancashire and adjoining counties have visited the exhibition. Last Tuesday, following a joint meeting of the Lancashire and Yorkshire Commercial Sections of the Manchester District Institution of Gas Engineers, most of the members made an inspection of the stands. It is anticipated that to-day (Tuesday) and to-morrow others from further afield will visit the exhibition, on the occasion of the annual meetings to be held of the Smoke Abatement League of Great Britain.

Among the Exhibitors.

By an unfortunate oversight, a detailed notice of the exhibits by Messrs. Fletcher, Russell, and Co., of Warrington and London, was omitted in last week's report. The firm have two stands, adjoining each other, in a prominent position near the main entrance—one being devoted to working exhibits of gas-heated furnaces especially designed for use in the various processes in the iron, steel, and allied trades, and the other to a display of gas-fires, water-heaters, geysers, and cooking apparatus. Mr. Knowles, who devotes special attention to the latter stand, has been kept busy from day to day, with his assistants, demonstrating the possibilities of gas for cooking and heating by means of the firm's present season's productions. There is a very fine selection of their gas-fires, including the "Palermo," "Como," "Oporto," "Borneo," "Vigo," and others of the name series, fitted with the firm's patent non-lighting-back burners, with gas and air adjusters. Here the visitor can see the arrangement by which the burners may be reversed to suit right or left hand supply, and also models with the boiling-ring on the top, or at the side. The latter come in for a good deal of attention. In the case of the side boiling-ring, the burner is fixed; while the trivet itself is the only movable part. One effect of this is that the trivet can be swung in front of the fire for keeping anything hot without the burner being kept in use. The artistically designed "Como," for nursery or bedroom, is another exhibit which commands attention, with its removable fender, copper reflector, and ornamental side wings. Those who do not care for the fender can have the "Como A," which is simply made with an ornamental base; there being a boiling-ring on top. Another of this series is the "Palermo" 13 N fire. As to radiators, there is the popular "Ivor," which can be fitted up in any number of columns from two upwards. Then there is the "Sypho" stove, which is condensing and modernized. Not the least attractive exhibits on this stand are the gas water-heaters. The firm have made a special line of these; and they are constructed so as to cause as little trouble as possible, but giving a very high efficiency. The "Hotspring" heater, for example, promptly delivers water at 40° Fahr. above the temperature of the cold water supply, without trespassing upon the duty kept in reserve as a margin; and in the case of the "Ajax" heater, it is 45° Fahr. Samples are also shown of the "Castalia" series of water-heaters, and of water-boilers. Mr. Knowles is in possession of a testimonial regarding the "Hotspring" water-heater, which interested visitors are shown. A London firm write to say they have had nine of them in daily use in their chambers; "and they are a great success—in fact, quite the most successful hot-water apparatus we have seen, especially for flats and chambers." Mr. J. H. Singleton, who has charge of the stand with the gas-heated furnaces, gives frequent demonstrations of the working of the models he has on exhibit. There is a high-speed steel furnace for hardening cutters, dies, milling, and lathe tools. One advantage claimed for this is that all the waste heat is conveyed into a secondary chamber and again utilized; so that they get the full value of the gas used—the amount being about 4 cubic feet of gas per pound of metal. A temperature of over 2500° Fahr.—more than sufficient to harden high-speed steel—is easily obtainable by the firm's furnaces. There is also, among other exhibits, a sample of the revised series of muffle furnaces ("C" type) for tempering, hardening, annealing, enamelling, and other similar work; models of the firm's patent forges for forging, bar heating, drop stamping, &c.; and a smaller furnace especially constructed for hardening high-speed steel lathe tools—a pattern now in use in most large engineering shops in the country.

The stand of the Ramie Company, where the "Zeimar" incandescent mantle is seen in process of manufacture, is one that comes in for a good deal of notice. Nettle grass from which the mantles are made is shown in its various stages of manufacture, as well as the raw earths from which the Company extract the chemicals used in the making of the mantles. The firm have also on view various burners and fittings for domestic, street, works, and shop lighting.

At the Ferrybridge Foundry Company's stand, several of their exhibits are now seen in operation, including a cooking-range with the patent "Howmatash" smokeless lifting fire and warming and ventilating stoves.

The Richmond Gas Stove and Meter Company have had numerous inquiries since the opening day in respect of the wide range of gas-fires they have on exhibition; and a fair number of orders have been booked. Their "Daisy" greenhouse heater is an exhibit that receives a good deal of notice. It is arranged for the boiler to fit inside the house, while the flue-pipe and lighting door are outside—thus making it very economical, and avoiding risk of damage to plants.

A speciality of the "Ovee" Light Company not previously mentioned is their high-pressure gas plant of 130 cubic feet capacity per hour, driven by an electric motor of ¼ H.P. The firm have similar plant in use up to 36,000 cubic feet per hour.

The Carron Company have now in action a drawing-room suite consisting of a No. 741 gas-interior, fitted with tile panels, hearth, and mantel; and also a dining-room suite of fumed oak mantel with tile surround, and fitted with a new pattern gas-fire.

The Maughan geysers shown in operation at the stand of the Parkinson Stove Company are still a distinctive feature of the firm's exhibits.

Messrs. R. & A. Main, Messrs. John Wright and Co., and the Davis Gas-Stove Company all record plenty of inquiries for their specialities; and a satisfactory result from a business point of view is expected.

A very effective display on the electricity side is that of the General Electric Company, who make the most of the osram lamp and their "Archer" system of electric cooking. In fact, this is a most comprehensive demonstration of the way in which electricity can be applied to domestic uses—there being egg-boilers, shaving-water heaters, curling-irons, and hair-dryers in the list.

The "Gas House" continues to form one of the chief attractions at the exhibition; and the "Electric House" receives numerous callers. Not the least interesting part about these are the exhibitions given of the advantages of gas and electricity for all domestic purposes.

The "Coalexld" burning at the stand of the Company is made by the Stretford Gas Company at their works. The stand is admirably arranged for showing the different methods by which the fuel may be used.

In the gallery there is to be seen a "smokeless city" complete with scale model of houses, public buildings, churches, &c., and setting out roads, gardens, parks, and streets in a comprehensive manner.

Both the Manchester and Salford Gas and Electricity Departments have offices in the exhibition where visitors can be furnished with the fullest particulars as to the supply of gas and electric fires, stoves, &c., and orders for the same can be placed. It may be a matter for wonderment to some to find that the Board of Trade Labour Exchange have also an office at the exhibition.

In last week's report, among the list of those present at the opening of the exhibition was included the name of Mr. J. E. Lamb, of Altrincham. This was a mistake, as Mr. Lamb was (we are sorry to learn) at the time laid up ill at home.

The Birlé Coal-Waggon.—With reference to the coal-tipping waggon in use at the Nice Gas-Works, as described in the article which appeared in the "Journal" for the 24th of October last (p. 244), it should have been mentioned that M. Birlé, the Engineer of the Nice Tramways Company, the designer of the waggon, has patented it in the principal countries; the English patent being No. 8859, Aug. 12, 1910.

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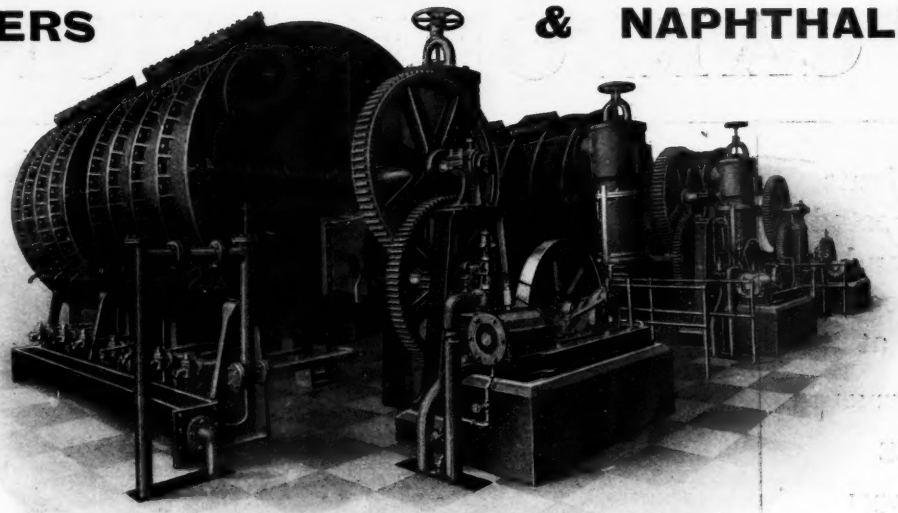
HOLMES' WASHERS FOR AMMONIA & NAPHTHALENE.



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TOTAL CAPACITY, 7,500,000 Cub. Ft. per Day.

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GODIN'S STOVES.

BURNING COKE, COST 3d. for 24 Hours.

A Consulting Engineer writes:—

"**GODIN'S COKE STOVES** deserve the attention of Gas Companies, especially during the present high price of household coal, and good **COKE STOVES** ought to be in the Show-Room of all Gas Companies."

Godin's Stoves have been sold for over 60 years all over the World, largely in FRANCE, GERMANY, AMERICA, &c.

Price **50/-** 3500 cubic ft. Heating Capacity.

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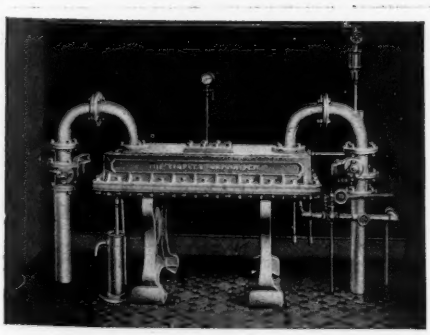
THE "SIMPLEX" VAPORIZER.



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Fixed near the inlet or outlet of Gasholder, it can be used to vaporize a suitable Hydrocarbon into the Gas in such quantities as to entirely prevent the deposition of Naphthaline in the mains or consumers' services.

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LAUSANNE. The plant erected for the Municipality fulfilled all guarantees in the first month's working; has MADE THE WHOLE OF THE GAS FOR THE TOWN since January.

The make of gas has averaged 12,676 cubic feet per ton; 617 B.T.U's gross; 13.2 per cent. Fuel, since the first day of working to present day; and over a period of seven weeks, May 1st—June 9th, the results have averaged 13,174 cubic feet per ton; 591 B.T.U's gross; 13.1 per cent. Fuel.

The plant has received the highest praise from distinguished Continental Experts.

SOME ASPECTS OF LIGHTING.

By the Engineering Correspondent of the "Daily Telegraph."

Historical.

It is necessary to recapitulate the reasons which have led up to the writing of this article. Readers of the "Journal" will remember that, at Olympia, a few weeks ago, the electrical firms of this country had an exhibition of apparatus. The writer attended that exhibition. He contributed, entirely on his own initiative, an article on electric lighting to the leading journal with which he has been, for some years, connected. The inspiration of the article was the exhibition.

At the same time, it must be clearly understood that the matter discussed in that article was not one of which the writer of it obtained all his impressions at Olympia. As an engineer, and a citizen, he has been interested for some years, in problems of artificial lighting. From time to time, he has been consulted, as to the best method of illumination. He is not a specialist upon the subject, but he does know men who are absolutely independent authorities, and men who have been trained in a thoroughly scientific fashion. He has been especially privileged to witness tests made with various illuminants. He watches the literature of the scientific societies. He has—rightly or wrongly—come to a very definite conclusion, based upon evidence which will be discussed later, and which may be utterly fallacious. At any rate, he has come to a conclusion upon a subject concerning which he is not in the least interested, except as a scientific investigator. It is quite open to any reader of the "Journal" to point out the fallacy of the evidence to be used. It is not open to them to say that the writer is everything that is wicked, and is seeking to throttle a great national industry—for a reason not stated.

Acting upon his conclusions, the writer then wrote an article on electric lighting. The Editor of the "Journal" immediately severely criticized it. So far as the writer is aware the rest of the Technical Press passed it by without comment. The Editor of the "Journal" attacked, not only the article, but the writer of it, which was not fairplay. It is only fair to add that the Editor acted courteously in one respect—he invited the writer to explain his reasons for compiling the sentences about which he complained. Although strongly advised by all independent men to whom he has spoken on the subject that he would merely waste his time by such explanation, the writer has determined to accept an invitation which he assumes was given in courtesy. He does not for a moment suppose that the readers of the "Journal," of whom a minute minority are independent or unbiassed, will give him credit for sanity of judgment. He does think, however, that he will tell a great industry a few home truths, which may mean bitter moments while reading, but which, if taken in an English spirit, should, at any rate, lift the scales from the eyes of some of its votaries. The Editor may retort that there is a mote in the eye of the writer. If it can be shown that he is in error, he will certainly admit that fact.

The "Journal of Gas Lighting."

We now come back to the scathing criticism in the "Journal of Gas Lighting," in which, interspersed with a good deal of the Editor's personal opinion, we find quotations from the writer's article in the "Daily Telegraph." It is proposed to take up these points, so far as is reasonable with space limitations. But it is necessary to make here and now a definite statement which is not open to criticism. It is that almost the last person to whom any sane person would appeal for an unbiassed opinion upon such a controversial subject as illumination by gas and electricity is the Editor of the "Journal of Gas Lighting." The same remark holds good, to some extent, for all papers connected with gas and electricity. But the Editor of the "Journal of Gas Lighting" is well known for his extreme opinions upon this subject. It is quite probable that the readers of the "Journal" never look at the electrical papers. If they did they would find that the one individual to whom they all refer as an extreme exponent of gas interests is the Editor of the "Journal of Gas Lighting." They do not seem to pay the same compliment to other editors. Again, it is perfectly obvious that the development of any industry must affect the technical papers connected with it. If Parliament decided to-morrow that all the gas-works of this country must close-down, on account of imaginary dangers, the "Journal of Gas Lighting" would cease to exist. If Parliament decided that electricity was one of the works of the Devil and ban it, the electrical journals would die. So far as the writer is aware, the coming of either calamities would not affect him more than any other average engineer; for, of course, the community would all suffer as individuals. Therefore, in all good faith, and with every courtesy due to a scientific controversy, the writer submits that the Editor of the "Journal" is not an independent critic. He is biassed from the sole of his boots to the point of his pen. That reflects nothing upon the present Editor—if the writer held the position he also would be biassed, possibly more biassed than the present Editor. Indeed, it is possibly a great compliment to the present Editor to point out the fact that he is biassed.

It is open to the "Journal of Gas Lighting" to say, as it has said, that the "Engineering Correspondent" of the "Daily Telegraph" is biassed. To that accusation he must, to some extent plead guilty. In common with every engineer who is scientifically trained, he learnt a considerable amount about electricity in his college days. In common with all engineers who have to deal with motive power and experimental work, he has witnessed the remarkable development of electrical science, of which even the man-in-the-street is not altogether ignorant. He has had a good deal to do with gas-engines and the measurement of calorific powers of gases. He has joined the Institution of Electrical Engineers, merely because he was at one time a demonstrator in an electrical laboratory at a College. He would probably have joined the Institution of Gas Engineers if his knowledge of elementary chemistry had made him eligible.

In visiting the engineering institution buildings, the electrical journals are more readily in evidence than are those devoted to gas. He has, therefore, in common with most engineers who do not specialize as gas engineers, probably seen more of the electrical papers than of the gas journals. Being, as already stated, intimately connected with gas-engine practice, the matter of coal gas has, however, not been altogether neglected. An apology should be given for such a personal explanation; but the writer wishes to make the point of view of the average engineer quite clear. He sincerely believes that electrical engineers are better trained and have more knowledge of scientific measurement than have gas engineers.

FACT AND OPINION.

The "Journal of Gas Lighting" Oct. 10 (p. 93), says of the "Engineering Correspondent" as follows: "The first points to which exception is taken are in these quotations: 'For outdoor illumination, such as shops, streets, and workshops, the arc lamp has firmly established its superiority.'" Well, the writer firmly believes that to be a fact; and in reply to the questions which follow, he answers an emphatic "Yes." The following figures were in his possession at the time, and some of them have since been checked.

With an assistant, he has visited Woolwich, and has examined the row of shops mentioned in a previous article. Measurements were made, by photometer, of the horizontal illumination 12 feet from the shop windows and 4 feet from the ground. The illumination over the whole front is strikingly uniform, a variation of less than 10 per cent. being noticed (if we omit a blank gateway between the two rival rows of illumination). Viewed from across the street, the illumination due to gas suffers somewhat from the extreme glare from the mantles in clear globes. [Mr. Gaster, Nov. 24, 1910, said—and most people agree with him on the point—"lamps must not be placed to dazzle and bewilder people by their brilliance."] The definite quotations of the two authorities for that site is £45 per 55 feet frontage for gas, and £32 for 80 feet frontage for electricity. We have, therefore, in this case electricity at 8s. per foot of frontage, and gas at 16s. per foot of frontage for practically equal results.

At the suggestion of the Editor of the "Journal of Gas Lighting," the writer communicated with the Gas Company for comments. For reasons which they stated, they preferred to make no other comment than that the electricity works have a large debt.

An Analysis of Figures.

It is perfectly fair to say that at Woolwich they are giving away gas or electricity, *if the analysis of the figures prove it.* For that reason, the writer gives his own estimate of the electrical figures. which shows that the current is supplied at 3d. per unit. Now under proper management and financial conditions, it is commercially possible to generate and distribute electricity for lighting purposes at 3d. a unit. Let us therefore examine the bill of costs on that basis. A working year of 800 hours is taken. The flame arcs are 10 ampere lamps.

Table of Assumed Costs at Woolwich.

	£	s.	d.
1680 units of electrical energy at 3d. per unit . . .	21	0	0
440 pairs of carbons	5	0	0
Labour + 12½ per cent for supervision	2	8	0
Hire and Maintenance	3	12	0
Total cost per annum	£32	0	0

The figures may be inaccurate. But before the writer accepted the statement of the circular, he worked them out like that; and he came to the conclusion that (irrespective of financial difficulties at any particular supply station) it is commercially possible to light 80 feet of frontage by flame arcs, when 3d. a unit is charged, for £32 per annum.

In criticizing the above figures, it must be remembered that it is no good quibbling about two or three pounds. Thus the critic might say that 660 pairs of carbons should be allowed for—in which case the cost of that item is £7 10s. But, in order to prove a case for gas at £45 for 55 feet frontage, as against electricity for £32 and 80 feet, the above £32 must exceed £64.

It is more difficult to analyze the gas figures; and the simplest thing to do is to request any of the "Journal" correspondents to show how they can arrive at the figure of the estimate. Further, as the Woolwich electricity authority have not—so far as the writer

is aware—published their figures, they also should have an opportunity of criticizing the writer's estimate just given.

Mr. Farquhar's Figures.

We now come to analyze the figures supplied—and quoted against the present writer in the "Journal of Gas Lighting"—in a recent paper by Mr. W. B. Farquhar, Gas Engineer to the Ilford Company. These are 1000-candle power lamps at £4. Let us take the 800-hour year as for electricity at Woolwich.

Independent tests made by Professor J. T. Morris [see "Illuminating Engineer," August, 1908], published, and, as far as the writer is aware, unchallenged, give the consumption of gas at 30 cubic feet per hour. We arrive at the following figures. The cost of the lamp is taken at £3, and the depreciation of these lamps is very rapid.

Table of Assumed Costs at Ilford.

	£	s.	d.
Compressing (an actual case of 12 lamps)		8	0
Labour and supervision		12	0
Hire and depreciation of lamps (25 per cent.)		15	0
" " " posts and mains (7½ per cent. on £20)	1	10	0
Burners, globes, &c.	0	3	0
	3	8	0
24,000 cubic feet of gas at 6d. per 1000 cubic feet	0	12	0
As per esitmate	£4	0	0

Thus we have gas at 6d. per 1000 cubic feet at the compressing station (which may be miles from the works) and electricity at 3d. per unit at the consumer's meter. The high-pressure gas-mains seem to be useless for the purposes of general supply, since the pressure is off 20 hours a day, and so the whole cost must be put down to the parade at Woolwich or other locality. Seven-and-a-half per cent. interest and depreciation gives a life (without painting or alteration) of 20 years. If gas can be so supplied at 6d. per 1000, it is, of course, from the above figures, as cheap as current at 3d. per unit under the conditions quoted.

Westminster and Whitehall.

The writer now begs the patience of the reader a little, while he analyzes the figures for Whitehall. In this case, the lighting is for public streets, and the number of hours per annum is 3940.

From Mr. Bradley's report, we see that 985-candle power was obtained at a gas consumption of 28 cubic feet per hour. [Professor Morris and Mr. Haydn Harrison found this figure to be 30 cubic feet; and the difference is roughly 7 per cent. The effect of 28 cubic feet as against 30 cubic feet on the Ilford figures would bring the price of gas there up to 6½d. per 1000.] If we assume, as seems reasonable and as we have no other data, that the 1800-candle power lamps consume gas at the same rate per candle power, we have therefore a consumption of 51·16 cubic feet per hour for 1800-candle power. Multiply this by 3940 hours and estimate at 1s. 6d. per 1000 cubic feet, and we arrive at a figure of £15 2s. 6d. cost of gas. We have, therefore, the following analysis:

Figures for Whitehall.

	£	s.	d.
Cost of gas, 3940 hours at 1s. 6d. per 1000	£15	2	6
Cost of maintenance, cleaning, compressing, lighting, extinguishing, mantles, by-pass gas, &c., *per annum*		7	6
Figure (by public contract)	£15	10	0

An unbiassed individual who examines those figures must inevitably be of the opinion that gas is being sold at something of the Ilford level—certainly at less than 1s. per 1000 cubic feet.

If the above figures are not accurate, will someone in authority supply a correct estimate, including each detail enumerated?

Calorific Value of Gas.

The writer now comes to a problem which seems to have more or less escaped discussion in controversies concerning gas lighting, and which seems to him to be of great importance. It is, indeed, one of the things which has led him to form his opinions which are unfavourable to gas lighting. It is the variation in candle power due to variation of calorific value. It is urgently needed that gas of a *minimum value of heat energy* should be sold at a given price. When an engineer buys, as a commercial product, one kilowatt-hour of electricity (a B.O.T. unit), he *always* obtains a definite and constant amount of energy. When he buys 1000 cubic feet of gas, he obtains a commodity the value of which varies from 160·3 to 110·6 [p. 235, "Journal of Gas Lighting"]. That is not scientific. Volumes are all right for filling balloons, but *heat units* are wanted for incandescent mantles. In August, 1908, Professor Morris described some tests made. He said:

> "The inequity of the present system of charging by volume is well illustrated by the results obtained with the Keith lamp previously referred to. It is supplied by the manufacturers with the object of giving a specified candle power for a given rate of consumption of gas. What do we find it does in actual practice? The above tests show that the maximum candle power of the lamp is in one part of London about 800 candles; take it to another part of this city, and it yields 1250 candles;* and take it to Edinburgh, when it would probably yield some 1500 candles!"

* *Note by present writer.*—Yet the gas consumption per hour varied as 23·3 cubic feet for 720 candles; 22·8 for 780 candles; 23·8 for 1250 candles.

In the table referred to, we pick out at random the comparison for tests made on three dates—5th, 6th, and 11th of June, 1908—and select as a fair comparative standard the mean spherical candle power per cubic foot per hour, and we have 16·3, 18·6, and 28·6. Can anything be *more* erractic or unsatisfactory from a scientific point of view? Can we, in any commonsense fashion, we who have been trained in scientific work—can we accept general figures of gas consumption when we find that the very same lamp within five days gave, per cubic foot of gas per hour, respectively 28·6 and 16·3 candle power? Say 10-candle power in one part of London and 18 in another part *per same fraction of a cubic foot of gas.* Those tests were published, and they are authentic. The writer knew all the circumstances. Can you wonder that, as an independent scientific man, he loses faith in the statements made about gas?

Sources of Information.

We now come to the difficulty which faces us in connection with this problem—the sources of information. The writer appreciates the difficulty to the utmost. He has absolute and implicit faith in Professor J. T. Morris's tests. But he has stated in the columns of the "Journal of Gas Lighting" that he is willing to admit that his deductions from the information in his possession may be wrong. He requested more data. The suggestion was followed by a note of surprise. The writer said, further, in effect "I *may* be wrong; I want to do justice to gas and electricity. Will you help me? Will you arrange for a series of comparative tests by *independent* experts? Let the gas companies have their man, the electrical people theirs; and let us have a third man to see fair play." The idea was ridiculed in the "Journal." Hours have been spent, now and in last year, in attempting to find figures *which convey any meaning* as to the real cost of lighting by gas in the gas journals or proceedings. Nothing of any value is obtainable, or if it is it escaped the writer's notice.

Metal Filament Lamps.

We now come to the question of low-pressure gas lighting and the electrical equivalent, the metal filament lamp. The "Journal of Gas Lighting" says (Oct. 10), "Let us confine our attention to a 50-candle power inverted burner consuming 2½ cubic feet per hour." Mantles have performed this feat—in the testing laboratory of a gas company, but (so far as the present writer can discover) no calorific value of the gas has been given. [We have already mentioned how much the calorific power of the gas affects the candle power.] Mr. Haydn Harrison* is here quoted at length. "I propose, therefore, to lay before you the figures relating to the borough of St. Marylebone, where the incandescent gas-lamps have been lately replaced by electric (tungsten) lamps. In this case the procedure was as follows: The Electricity Supply Department of the Council was advised by their Consulting Engineer to ascertain exactly the illumination given by the existing gas-lamps, and *an outside testing authority intimately connected with the gas industry* was instructed to test at random 100 street gas-lamps in the district. The results showed an average for the single 4¼ cubic feet† gas-mantles of 50 candle power and 76·6 for the double mantles. Mr. Arthur Wright having discussed the matter with me, I tested to my own satisfaction, and found that with the single mantles I obtained an average of 45-candle power, and with the double 76-candle power." Again, "In reply to Mr. Solomon, with reference to the comparison between the illumination of the streets of Marylebone before and after the conversion of the gas-lamps to electric, it naturally refers to the gas-mantles in use at the time; these were exceptionally well maintained, and above the average to be found in many parts of London. Mr. Solomon seemed to think the figures in the paper were prejudiced in favour of electric lighting; the gas journals which had criticized the paper seemed to think the same thing; *nevertheless the figures of candle power were made by Messrs. Alexander Wright and Co., and also those of Mr. Abady, since published in a paper before the Gas Institute,* corroborated by the author's own tests."

The figure 76-candle power given by Mr. Harrison was obtained with enamelled reflectors over the mantles. It corresponds to a mean hemispherical candle power of 58 [*vide* "Illuminating Engineer," Vol. III., p. 462]. If we take gas at 2s. 1d. per 1000 cubic feet,‡ we obtain 528 mean hemispherical candle power hours for 1d. Take 4¼ cubic feet consumption for 50-candle power (say 40 mean hemispherical candle power), we have 360 M.H.S. candle hours for 1d.

We now come to the 55-watt metallic filament lamp, which gives a better result—let us assume them equal. The whole thing hinges upon the calorific value of the gas, cost of maintenance, &c., the 4¼ cubic feet as against the 2½ cubic feet.

A figure which the writer has obtained is for maintenance and hire of a three-mantle intensive lantern, 4s. per quarter. Let us take the following estimate:

100,000 Candle-Hours—Gas.

A Two-Mantle Gas.

	s.	d.
4¼ cubic feet burner— 76 Max. c.p. / 58 M.H.S. c.p. } gas at 2s. 1d.	15	10
maintenance (say)	12	0
Total cost	27	10

* "Journal of the Institution of Electrical Engineers," 1910, p. 25.

† Again no calorific value is given.

‡ Assuming a constant calorific value.

A Single Mantle Gas.

4½ cubic feet burner—		
50 Max. c.p. }	gas at 2s. 1d.	23 4
40 M.H.S. c.p. }	maintenance	9 4
		32 8

A 50-c.p. *Metal Filament Lamp.*

50 c.p. }	electricity at 3d.	20 0
65 M.H.S. c.p. }	maintenance	3 0
		23 0

(In case of dispute over maintenance the electrical figure is 3s. for 1500 hours and the gas 9d. per burner per quarter.)

A word of explanation, *re* the maximum candle power. A 50-candle power electric light gives 40 mean spherical candle power and half is above the horizontal. With a Holophane reflector of 80 per cent. efficiency, this gives $40 \times \frac{80}{100} \times 40 = 72$ M.H.S. candle power.

The gas-mantle already has its reflector in place, so that the reflected light is included in the measurement.

A Personal Experience

After all, it is the things near to us which influence us most. It is of more importance to an Englishman whether his child is well or ill than if rivers of blood flow in China. It is more convincing to the householder concerning gas and electric interior lighting to have tried both and to know the results by experience than to read gas and electrical journals until his head spins.

The writer has a country cottage on the South Coast where electricity is obtainable. He experiences absolutely no trouble. For convenience and freedom from decoration renewals he would gladly pay double his electric light bill.

In the environs of London he lives in a district where his own house has gas-pipes—the newer ones electric light. He has friends in the new houses. He has tried every method with regard to gas lighting—has paid so much a quarter for maintenance of burners, mantles, &c., all to no effect. [He simply threw away the maintenance money, as the gas company's servants never called unless requested, and never cleaned out the burners, &c., when they did. They merely renewed mantles.] He complained, but to little purpose. As an engineer of some years' practical experience, he is certainly capable of adjusting the burners himself; but he does not want that sort of work in his own house—his time ought to be more valuable than that of a gas-fitter. But he has to do it, as the maintenance business, in his case, was merely throwing money away. It will cost him something, and there will be the nuisance of the workmen; but, unless this correspondence convinces him to do otherwise, he is going to have electric light put in instead of gas. Most of his friends (those who are non-technical men) are determined to do the same. We all think we shall compensate for the trouble of wiring by the absence of the decorators. Our friends lucky enough to have electric light say that they are quite confident we shall do so.

Causes of Progress.

The writer has visited the University of Leeds, and has there met Dr. Bone. He was one of the engineers in this country who, nearly ten years ago, wrote about the advantages of high-pressure gas. He has always believed that a great deal of progress could be made if the gas and electrical engineers met together and discussed these matters in a friendly fashion, as similar subjects are discussed by other scientific rivals. He believes that the gas industry of this country is suffering from a negligence, some fifteen or twenty years ago, of scientific research (you can, of course, point to Welsbach's discovery, but the gas industry of this country had nothing to do with that). Several years ago the writer advocated the sort of thing that has now been done at Leeds. But in almost every Engineering College of this country there is electrical research. What are the gas engineers doing, even nowadays, to compare with the researches of the electrical Engineers? An industry with a combined capital of many millions deserves to suffer if it will do nothing to further progress by new discoveries.

Further, can you expect progress when it is so difficult to find out what the facts actually are in connection with an industry? Every week the "Electrical Times" publishes an analysis of costs of running electricity works, and from that an intelligent reader can gather much information. Is there anything like it in connection with the gas industry? The one thing which has struck the writer more than anything else during his investigations of this problem is the entire absence of authentic and scientific facts concerning the cost of lighting by gas. He attributes this largely to the (average) unscientific training of those who are connected with the gas industry.

Conclusion.

His advice—for which he will, of course, not be thanked—is that these things should be remedied. Let the gas engineers publish analyses of their ordinary workaday costs, profits, &c. For example, let them take one of the London boroughs, make every night careful photometric measurements and publish the variation of candle power, total gas consumption, &c. Let them show the cost of upkeep, and every figure which affects the problem. Let them continue scientific research, as they have commenced in an all too small fashion at Leeds, at all the University centres of learning. Let them attend the meetings of the Institution of Electrical Engineers when there are papers which they say traduce the gas industry, and produce authentic figures to refute the traducers on their own ground. The Editor of the "Journal" has promised to publish figures which will convince.

Sometimes even the "Journal of Gas Lighting" makes mistakes, as the following extract will show:

> "Speaking of the Welsbach burner in 1886, the 'Journal of Gas Lighting' said that this latest of the many incandescent gas-burners that had been tried and found wanting was apparently not destined to prove a stronger foe to electric lighting than any other description of gas-burner." [A speaker reported in the "Journal of Gas Lighting," Oct. 10, 1911.]

Possibly the writer has made a similar mistake in this matter of his preference for electricity as against gas for lighting purposes. He awaits further evidence before he can alter his opinion. He is, however, not a bigot, and he will weigh carefully all the figures which are to be produced. He has in the past done a good deal with his pen, and a little in research, concerning the gas-engine. He is not antagonistic to the gas industry. He will gladly do all in his power to help and assist it. He cannot, however, accept anything that is not convincing to any man trained in science. And quoting the price of gas per thousand cubic feet without giving the heating power is like quoting ampéres of electricity with no mention of pressures. The electrical engineer who did this would be ridiculed by any man of science.

In conclusion, the writer begs to thank the Editor of the "Journal" for his courtesy in offering this opportunity to speak out frankly to gas engineers. He makes a final plea for fair discussion, which he will continue only so long as it does not degenerate into personal abuse. He believes that the gas industry has much to gain by facing facts (as they have done with regard to their new Committee) and treating engineers as other great manufacturing industries treat them—with courtesy. Under these conditions, the writer will do everything in his power to assist a great national industry. It is quite possible that some unexpected and successful research—such as the discovery of the Welsbach mantle in its day—will place a weapon in the hands of the gas engineers which will give them an advantage. The writer sincerely hopes so. In any case, the gas industry is, apparently, not pessimistic of the future. There are many fields awaiting development, in addition to that of lighting.

Editorial Note.

Those of our readers who have not followed the controversy, of which the foregoing forms an important item, may marvel that an editorial comment does not appear simultaneously with the article. The "Engineering Correspondent," however, effectually prevented this, by making it one of the conditions of the communication that we should "refrain from editorial comment until the next issue of publication" (*ante*, pp. 253, 326). Rather than lose the promised defence of, or justification for, the views he had expressed in the "Daily Telegraph," we promptly accepted his conditions. It is therefore the turn of "Engineering Correspondent" this week; our turn next week. In addition to our own comments, readers are at liberty to make use of our columns, in criticizing "Engineering Correspondent's" statements and figures. In saying this, we will call attention to the first few lines of an editorial note to "Engineering Correspondent's" letter in the "Journal" for Oct. 24 (p. 253), in which we accepted the conditions laid down by him. Those lines ran: "Willingly, we consent to the conditions imposed by our correspondent, with the reservation in connection with the first one that, if anything is included in the article that might bring the 'Journal' into collision with third parties—such as through personal references, or comment upon matters that are the subject of contract—we shall have the right to delete or amend such matters, in consultation with our correspondent." That reservation will apply to any communications received from correspondents, though we do not anticipate any difficulty in this respect. What "Engineering Correspondent" particularly wants are facts and figures. Whether he deserves them, we are not allowed this week to say.

Woodall-Duckham Vertical Retort and Oven Construction Company, Limited.—This Company was registered last Tuesday with a capital of £50,100, in £10 shares, to carry on the business indicated in the title, as well as that of gas, mechanical, and general engineers, gas masters [?], ironmasters, &c.; and to adopt agreements (1) with Duckham and Cloudsley, Limited, and Woodall and Duckham, Limited, and (2) with Duckham and Cloudsley, Limited, Gibbons Bros., Limited, Newton, Chambers, and Co., Limited, and Thomas Vale and Sons, Limited. The signatories are W. P. Gibbons, Rinton House, near Dudley (the Chairman of Gibbon Bros., Limited); W. N. Drew, Raincliffe, Ecclesfield, Sheffield (Vice-Chairman of Newton, Chambers, and Co., Limited); F. Vale, Ravenhurst, Stourport (Chairman of Thomas Vale and Sons, Limited). There are to be five Directors—two to be appointed by Duckham and Cloudsley, Limited, one by Gibbons Bros., Limited, one by Newton, Chambers, and Co., Limited, and one by Thomas Vale and Sons, Limited.

TECHNICAL METHODS OF CHEMICAL ANALYSIS.*

THREE years have passed since we had the pleasure of reviewing the first volume of the work on "Technical Methods of Chemical Analysis," edited by Professor Lunge, in collaboration with a number of authoritative German authors and English translators and editors. ["JOURNAL," Vol. CIV., pp. 31, 116.] It was then indicated that the second volume would embody more matter than the first of direct interest to gas and water engineers. The first volume contained only three chapters in which gas chemists would be specially interested—viz., on "Technical Gas Analysis," "Fuel Analysis," and "The Analysis of Air." Of importance to water engineers were the chapters in that volume on "Drinking Water and Water Supplies," "Feed Water for Boilers and Water for Other Technical Purposes," and on "Sewage and Effluents." Much of Vol. I. was given up to subjects of interest primarily only to chemists concerned with other technical industries. Vol. II., however, which is now before us, should appeal more directly to the attention of gas chemists and engineers.

Vol. II. of the work, like its predecessor, is in two parts, bound separately, but apparently only purchasable as a whole. The necessarily high price which is charged for the two volumes will preclude many technical men who require only the methods of analysis relating directly to illuminating gas and its bye-products from acquiring this portion of the work, which they probably would be glad to have always at hand in their private libraries for consultation. As it is, the circulation of the book seems likely to be restricted mainly to the reference libraries of public institutions and large industrial undertakings and works. For such reference libraries no better work than the present could be found; and our view is only that it might, by subdivision into sections applicable to particular industries, have been made available for the private libraries of individuals who cannot afford to expend a large sum for the purchase of volumes of which a great part of the contents is of no special interest to them. Technical chemical analysis is now in the hands of men who have closely studied and practised only particular branches of it, and who rarely go outside their own branch. But in so far as their own branch is concerned, they are naturally anxious to have the very latest available text-book always at hand in a conveniently compact form.

The present "volume" includes in its first part seven sections. The first, by Dr. P. Aulich, of Duisberg, translated and revised by W. J. Lambert, deals with "Iron." The second section, by Professor O. Pufahl, of Berlin, translated and revised by C. O. Bannister, is on "Metals other than Iron, and Metallic Salts." The third section, by the late Professor O. Böttcher, of Möckern, translated and revised by Alfred Smetham, deals with "Artificial Manures." The fourth section, by Dr. F. Barnstein, of Möckern, on "Feeding Stuffs," is revised by the same translator as the third section. The fifth section, dealing with "Explosives," was written and revised by the late Oscar Guttmann, of London. The sixth section, by Dr. A. Bujard, of Stuttgart, translated and revised by E. G. Clayton, is on "Matches and Fireworks." The seventh section, which concludes the first part of the "volume," is on "Calcium Carbide and Acetylene," and has been written by Professor Lunge and Dr. E. Berl, and translated and revised by Dr. J. T. Conroy. It will be seen from the foregoing enumeration of the sections comprising the first part of Vol. II. that the only sections likely to be of any direct interest to readers of the "JOURNAL" are those dealing with "Artificial Manures" and "Calcium Carbide and Acetylene." To these sections, therefore, we propose to give more attention than to the others.

The analysis of iron ores, with which the section on "Iron" opens, may be passed over without comment. The determination of the different constituents of iron and steel is specially interesting in view of the modern production for particular uses of special steels containing small quantities of other metals. The section on the analysis of metals other than iron deals with the analysis of the ores, commercial metals, and alloys of the following metals—viz., silver, gold, platinum, mercury, copper, lead, bismuth, tin, arsenic, antimony, zinc, cadmium, nickel and cobalt, manganese, uranium, vanadium, molybdenum, aluminium, thorium, and tantalum, and of the salts of the more important of these metals. The sections on iron and metals other than iron occupy about two-thirds of the first part of the volume. The section on "Artificial Manures" which follows is relatively short; and the special reference to the analysis of sulphate of ammonia is brief—but adequate for the general analyst. There is also a note on the analysis of sulphate of ammonia in the section on "Coal Gas and Ammonia" in the second part of the work. It is unnecessary to comment here on the short section on "Feeding Stuffs." In the section on "Explosives," the interest of our readers is likely to be restricted to the examination of ammonium nitrate and of picric acid; benzene, toluene, naphthalene, and phenol being dealt with in sections in the second part.

The section on "Matches and Fireworks" likewise will have only an indirect interest to our readers. The fact that "in 1908 British manufacturers and holders of patent rights in substitutes for phosphorus decided to stop using white phosphorus, provided that the importation of white phosphorus were prohibited," led to the passing of the White Phosphorus Matches Prohibition Act, which came into force last year. This enactment has thrown upon analysts the burden of detecting white phosphorus in match heads. The problem proves a somewhat difficult one for them, because white phosphorus is apt to separate from certain phosphorus compounds which are used in match compositions, and because the presence of potassium chlorate in these compositions precludes the use of ordinary tests for white phosphorus. Various methods have been proposed of a more or less satisfactory character; but it is very doubtful if a sharp line can be drawn between match heads in which white phosphorus has been used in the manufacture, and those in which no white phosphorus has been used.

The last section in the first part, on "Calcium Carbide and Acetylene," extends to only 25 pages. The methods of examination of calcium carbide given are mainly based on those of the German and British Acetylene Associations, which are included in the ordinary text-books on acetylene. Dr. Conroy has done the work of revision of this section quite satisfactorily, though, as might be supposed, there is little, if any, matter in it which has not already been published elsewhere.

Passing on to the second part of Vol. II., the first section is on "Illuminating Gas and Ammonia," originally written by Dr. O. Pfeiffer, of Magdeburg, and translated and revised by Dr. Harold G. Colman. The second section of this part, on "Coal Tar," has been written by Dr. H. Köhler, of Berlin, and translated and revised by Professor A. G. Green. The third and concluding section is on "Organic Dyes," by Professor R. Gnehm, of Zürich, and the translator and reviser is Dr. J. C. Cain.

The section on "Illuminating Gas and Ammonia" comprises about 140 pages, and is probably sufficiently comprehensive for the users of any general text-book of analytical chemistry. Evidences of the thorough revision which Dr. Colman has given the section are obvious to anyone familiar with the different types of apparatus and procedure followed in German gas-works, and described in the various writings of Dr. Pfeiffer. Dr. Colman's association with the translation and revision is sufficient guarantee that the methods described are not only accurate, but are also of a practical character. Though the work is primarily analytical, there are notes given from time to time as to the bearing of the results of analyses on practical working. Thus, we learn that in retort-furnaces the percentage of carbon dioxide in the furnace gas should not exceed about 6 per cent. in good working. The probable causes of higher percentages are then indicated. The methods of analysis of furnace gas are not described in this volume in detail, but the reader is referred to the section on "Technical Gas Analysis" in the first volume of the work. In connection with temperature measurements also, reference is made to the descriptions of different forms of pyrometer in that volume; but some notes are given as to the relative values of readings obtained by different types of pyrometer. Instruments for pressure measurement also are mentioned as having been described in the previous volume of the work.

In regard to gas-making materials, the methods of elementary analysis of coal are described in the section on "Fuel" in the first volume; but some further details are given of methods for the proximate analysis of coal for gas-works' purposes. The determination of volatile matter in coal has been the subject of much investigation in recent years at Zürich and elsewhere, and as the result the method recommended by the American Chemical Society's Committee is now generally accepted as the most suitable. The notes given on the direct valuation of coal by distillation are brief, but quite good. The analysis of oils for use in carburetting water gas is also dealt with briefly; and in regard to their distillation, reference is made to the section "Petroleum" which will be included in a subsequent volume of the work. There are also some valuable hints on the determination of sulphur in benzol and light oils intended for carburetting gas in the cold. The portion of the section which deals with gas analysis contains frequent references to the section on "Technical Gas Analysis" in the first volume. But there are a number of useful suggestions given in the present section.

Of apparatus for the complete analysis of coal gas, not previously described in the first volume of the work, descriptions are now given of those devised by Pfeiffer, Bone and Wheeler, and Jaeger. Pfeiffer's apparatus is not much known in this country, but Bone and Wheeler's modification of the Macleod-Frankland apparatus is known from the descriptions which they have given of it in some English journals. [See "JOURNAL," Vol. CI., p. 160.] The reference to this apparatus in the present book, however, antedates its invention by them by ten years—viz., 1898, instead of 1908. Jaeger's apparatus involves the usual estimation of carbon dioxide, heavy hydrocarbons, and carbon monoxide, by absorption, and the absorptions are followed by the fractional combustion of hydrogen and methane over copper oxide at different temperatures. The advantage of the method is that it does not require the addition of air or oxygen for the combustion; and consequently the whole of the unabsorbed gas is used for the estimation of the hydrogen and methane. The accuracy of the method is adequate; but the combustion of methane proceeds slowly. [For later adaptations of the method of fractional combustion over copper oxide, see "JOURNAL," *ante* p. 186.]

Special methods for estimating certain constituents in crude

* "Technical Methods of Chemical Analysis." Edited by George Lunge, Ph.D., Dr.Ing. Emeritus Professor of Technical Chemistry, Federal Polytechnic School, Zürich. English translation from the latest German edition, adapted to English conditions of manufacture. Edited by Charles Alexander Keane, D.Sc., Ph.D., Principal and Head of the Chemistry Department of the Sir John Cass Technical Institute, London. Volume II.—In Two Parts. Gurney and Jackson, London. 1911.

and purified illuminating gas are then described. For the separation of ethylene and benzene, advantage is taken of the fact that bromine forms with the former a more stable compound than with the latter. The ordinary methods for the estimation of sulphuretted hydrogen in gas are given; but no statement is made as to the sensitiveness of the test for traces of sulphuretted hydrogen with lead acetate paper. Indeed, this test, which is in universal use, does not appear to be mentioned at all. Both the Referees' and Drehschmidt's apparatus for the determination of sulphur in gas are described, as well as Somerville's volumetric method. In connection with the determination of naphthalene by picric acid, the very necessary precaution of avoiding india-rubber connections, which we believe was first pointed out by Dr. Colman, does not appear to be indicated; and the analyst unfamiliar with the determination is thus left without warning of the risk of falling thereby into serious error. Various methods for the determination of the specific gravity of gas are described, and then follows the important part dealing with the calorific and illuminating power of gas.

The diminishing importance of determinations of illuminating power in regard to statutory requirements, is duly indicated. Data are very fully given for calculating the calorific power of illuminating gas from its several constituents. The principal types of calorimeter have been described in the first volume of the work, and a few additional notes only are now added. The account of photometric standards and standard burners for gas is very good, as is also the account of photometers and photometer heads, or disc boxes.

Next comes a brief account of the methods of analysis of the materials used in the manufacture of mantles for incandescent burners. This is followed by methods of testing incidental to the purification of gas. Then the analysis of ammoniacal liquor is described, including methods for the complete analysis based on the work of Linder and of Mayer and Hempel. The section concludes with the analysis of ammonia products.

Speaking broadly, the section on illuminating gas and ammonia will be of comparatively little use to gas-works' analysts unless they have the first volume of the work at hand, since for very many operations they are referred to the section on "Technical Gas Analysis" and other sections in the first volume. Also, in one case at least, reference is made to the third volume. It thus appears that in order to get, through the medium of this work, the necessary information on the methods of analysis required in connection with the manufacture of illuminating gas, the analyst would be obliged to have at hand the complete work, nominally of three "volumes," but actually consisting of five or perhaps six parts, each bound separately and constituting in the ordinary sense a large volume. The cumbrousness of this method of finding the required information for the analytical work relating to a single industry is obvious. Clearly this is the fault of the scheme of the work; and the authors of the several sections have done as well as could be expected, subject to the limitations and disabilities which such a scheme has imposed on them.

The section on "Coal Tar," by Dr. Köhler, revised by Professor A. G. Green, begins with an account of the characteristics of different descriptions of tar. Much of this information is quite out of date. The average composition of London tar is now very different from that here quoted from a work which was published a good many years ago. The same remark applies to the information given in regard to the composition of water-gas tar. The oil-gas tar described also is not such as would be ordinarily obtained in English oil-gas works. The methods of determining the free carbon in tar and pitch described are not those most generally in use in this country. The examination of the products of the distillation of tar is dealt with, however, in a more trustworthy manner. The examination of benzol is very fully and well described, as is also that of anthracene. Commercial carbolic acid, and preparations of it and other phenols, are satisfactorily handled, as is also the examination of tar oils for use as fuel and for creosoting. The portion of the section dealing with pitch is also good; but in regard to the differentiation of coal-tar pitch from natural asphalts, and its examination with reference to use for paving purposes, the reader is referred to another work—which is in German. The section on tar as a whole is good, in so far as German coal tar and its products are concerned. The information in regard to English tars and their examination appears to us to have been taken without sufficient discrimination from other and early text-books, and very little, if any, original matter has been incorporated with it.

The section on "Organic Dyes," by Professor Gnehm, of Zürich, translated by Dr. J. C. Cain, is the longest section in the volume, comprising as it does some 340 pages. It starts with a description of the raw materials obtained from coal tar, and gives details supplementary to those found in previous pages of the volume of methods of examination of these materials. This portion of the section should be of value to those interested in coal-tar products intended for use in the dye industry. It is followed by an account of the properties and examination of other raw materials for the industry. Then the special branch of organic dyes is directly dealt with, and, so far as we have observed, handled very satisfactorily within the limits of space allotted to it. There is a valuable tabular enumeration of most of the commercial dye-stuffs and their more important reactions, with the names of the producing firms. Lastly, naturally occurring dye-stuffs—such as indigo, logwood, and cochineal—are referred to in detail.

The volume concludes with an appendix, in which the various tables already given in the text are reproduced. There are a subject index and a name index, both of which appear to be very complete. A number of misprints occur throughout the work; and it is regrettable that in the English edition of a German work the names of important German technical journals should be misspelt, as is the case with the latter part of the title of our contemporary, the "Journal für Gasbeleuchtung und Wasserversorgung," and with the "Zeitschrift" of the Association of German Engineer, to cite only two cases. These are, however, only superficial blemishes in the work, which, as a whole, is an excellent production, though, to our mind, on mistaken lines.

PROGRESS IN THE GAS INDUSTRY IN 1910.*

We have received a copy of a year-book of the advances in methods of lighting and in the gas industry in the year 1910, which has been compiled at the instance of the Association of Gas and Water Engineers of Austria-Hungary by Dr. Strache, the well-known Professor and head of the Experimental Gas-Lighting and Fuel Testing Laboratory at the Technical College at Vienna.

The work is a notable one, in that it presents a coherent narrative of the technical progress of methods of lighting, and of the gas industry in particular, during the past year. Nothing of importance, either in his own country or abroad, appears to have escaped the attention of the compiler; while the various items have been brought together under suitable headings, so that all references to a particular branch of the subject may be found in consecutive paragraphs in which their bearing one on the other is well indicated. It would occupy too much space, and be unfair to the author and publishers, to quote freely, as we might well wish to do; and, therefore, we will merely indicate the scope and general arrangement of the volume, while commending it to the attention of all readers of the "Journal" with sufficient knowledge of the German language to follow Dr. Strache's chronicle. To him we offer our congratulations on the care and assiduity which he has displayed in its preparation.

The volume opens with some references to recent studies of the origin of the word "gas." They do not appear, however, to carry us further than Skeat's derivation of the word from the Dutch "gheest," meaning spirit or volatile fluid, allied to the English "ghost." Neither does the word appear to have been traced to an earlier user than J. B. van Helmont, who died in 1644. Then the compiler passes on to the development in the output of gas during the year, especially in the direction of the lighting of public thoroughfares and business premises. Reference is made to the probable duration of supplies from known coal-fields. The Upper Silesian coal-field is credited with a longer life than the other German, or the English, Belgian, French, and American coal deposits. The Wandsworth and Putney Gas Company is indicated as supplying the cheapest gas for power and industrial purposes; but this would (without correction) be properly disputed by Widnes and Sheffield. As an instance of rapid development in the use of gas, it is mentioned that the Hamburg gas undertaking has in the last decade experienced an increase of nearly 100 per cent. in the sales of gas. Then follows an abstract of researches on the physiological impression of light on the eye, on the efficiency of different sources of light, and on the mechanical equivalent of light. Attention is next called to new figures for the specific heats of gases, estimations of flame temperatures, and advances in pyrometry and calorimetry, in which due reference is made to the work of English investigators. The inception of the "International Candle" is chronicled, and the views of representative National Gas Associations thereon indicated. New proposals for primary and absolute units of light are alluded to; and then follow notes on methods of photometry and new types of photometer to measure spherical and hemispherical illuminating power and illumination.

Dr. Strache next deals with pressure-gauges and inferential meters which have been recently suggested for various purposes. The section on gas analysis which follows is comprehensive, and does not omit (as many publications in the German language are apt to do) reference to English and American advances in analytical chemistry. The examination, storage, and transport of coal are next dealt with. Then follow notes on carbonization, in which Burgess and Wheeler's researches on the course of gasification of bituminous coal are duly mentioned.

The succeeding section—on retort-settings—deals largely with the regulation of heats and researches on the refractory materials of construction. Then comes the important section on verticals and chamber-settings, in which reference is made to all recent types, and tabular statements are given of the reports published during the year from various works of the results of carbonization in them. The compiler has endeavoured to put these results on a comparable footing by stating the temperature at which the gas was measured, both for yield and for the determination of

* Die Fortschritte des Beleuchtungswesens und der Gasindustrie im Jahre 1910. Im Auftrage des Vereines der Gas und Wasser Fachmänner in Oesterreich-Ungarn zusammengestellt von Professor Dr. H. Strache, Leiter der Versuchsanstalt für Gasbeleuchtung, Brennstoffe und Feuerungsanlagen an der k. k. technischen Hochschule in Wien, Rat des k. k. Patentamtes. R. Oldenbourg, Munich and Berlin; 1911.

calorific power. But in many instances the necessary data have not been forthcoming in the original papers. The fuel consumption for different types of settings is also given in a tabular statement. The more recently published results for continuous vertical retorts are not given, because the book refers to the year 1910; but references are included later to the advantages claimed for continuous carbonization, and to the earlier performances of some settings of this type. The sections which follow—on wages, cost of installation, repairs, and ground space occupied for the different types of settings—are valuable, in that they appear to include allusions to all that has transpired during the year in regard to these points. The quality of the bye-products, the removal of coke, and exact determinations of the temperature in carbonizing settings are next dealt with. The advantages of steaming in vertical retorts, of continuous carbonization, of different types of stoking machinery, and coke-conveyors are next chronicled.

Condensers, tar extractors, naphthalene and cyanogen washers form the subjects of the ensuing section, which is followed by one on purification, in which results obtained with Feld's and Burkheiser's processes are quoted. A separate section on the removal of carbon bisulphide reviews the history of early processes, as well as researches which have been made during the year on new suggestions, which, it may be observed, have led to little or no practical result. The working up of bye-products is next dealt with; and then follows a section on gasholders, the opening paragraph of which we venture to translate:

"By the introduction of the bulged tank by the United Engineering Works of Augsburg-Nuremberg, it has become possible to choose plates for the gasholder tank of a thickness scarcely one-fifth of the thickness otherwise required for large holders. Recently the firm in question has erected for the Vienna Corporation gas-works at Leopoldau a gasholder of 8,800,000 cubic feet capacity with bulged tank. The tank has a diameter of 277 feet, and a height of 36 feet. Nevertheless, the thickness of the plates is only 0·28 inch. The bell is in five lifts, each lift being 16·4 feet deep."

The holder referred to in this paragraph is the one of which the top lift collapsed while the holder was being tested for soundness a few months ago. [See "JOURNAL," Vol. CXV., p. 478.] Reference is made by the author to the catastrophe to the large gasholder at the Grasbrook works at Hamburg, and to the discussions which ensued as to the cause of the failure of the tank in this case. Station governors are next dealt with. A paragraph follows on the prevention of accidents in gas-works, mainly based on papers by Dr. Leybold. Then comes an interesting section in which the formulæ for the flow of gas in mains, and high-pressure mains in particular, are discussed in the light of recent studies and investigations of them. The electrolytic destruction of mains is next referred to. Then various proposals for the prevention of accidents from the escape of gas are given. Gas-meters are next alluded to; and there is then an interesting section on the most suitable quality of coal gas, in which reference is made to the columns of the "JOURNAL" to show that the disposition in England at the time is not to impose a standard of calorific power in addition to the existing standard of illuminating power, but to substitute the former for the latter.

Sections follow on coke-oven gas, oil gas, acetylene, and natural gas; then on producer gas, and semi-water gas, and water gas both carburetted and uncarburetted. In regard to the latter, Dr. Strache naturally speaks with full knowledge and authority. An interesting diagram is given, from researches made by Scheller, in which the quantities of oil or of benzol required for carburetting simple water gas, in order to raise its calorific power to any desired extent up to a maximum representing the calorific power of coal gas, are shown by curves. The special preparations of coal gas and other gases designed for the filling of airships are then dealt with by the compiler.

Burners, upright and inverted, mantles, and lanterns for street lighting, receive exhaustive notice. Then comes a section on railway carriage lighting, in which the advances made in the use of gas owing to the introduction of the inverted mantle are mentioned. Incidentally it is pointed out that in cases of accident trains may be set on fire by the locomotive, and that fires have occurred in electrically-lighted trains owing to short-circuiting. One such case was that of a sleeping car on the Pennsylvania Railway, another happened in the *train de luxe* from Copenhagen to Berlin, and another in a train at Liverpool. The compiler remarks that these occurrences show that in ordinary working gas lighting is as safe as electric lighting for trains, because electric lighting is liable to cause fires during the journey, which is a danger never found with gas lighting.

New methods of automatic ignition and extinction of gas-lamps are very fully dealt with; and Dr. Strache proceeds to quote comparisons of the cost of different methods of lighting. It is pointed out, from experiments made at the Reichsanstalt and elsewhere, that the mean spherical illuminating power of metallic filament electric lamps is considerably lower than the mean horizontal illuminating power. Consequently, a higher consumption of current than is ordinarily ascribed to these lamps per candle-power must be assigned to them if, as is right for most purposes, the mean spherical illuminating power is taken instead of the horizontal illuminating power. As an instance of the inability of the community at the present day to dispense with gas, notwithstanding the existence of a cheap supply of electricity, it is pointed out that whereas electrical power is now being transmitted from the waterfall at Lauffen on the Neckar to the far-distant city of Frankfort-on-Maine, nevertheless Lauffen has recently erected a gas-works.

Then comes a section on heating and cooking by gas. Figures quoted from Schilling for the relative cost of cooking with current at 2½d. per unit, and gas at 4s. per 1000 cubic feet, may be translated for the guidance of any persons who may have been misled by representations made at the recent Electrical Exhibition.

	Cost of Electricity.	Cost of Gas.
To heat 1 quart of water to boiling point	0·3d.	0·007d.
,, boil four cups of coffee	0·15d.	0·04d.
,, boil 2 lbs. of meat	0·61d.	0·11d.
,, bake 1½ lbs. of potatoes	0·41d.	0·12d.
,, grill three cutlets	0·24d.	0·06d.
,, roast 2 lbs. of veal and make gravy	1·74d.	0·017d.
,, One hour's ironing	0·86d.	0·44d.

The efficiency of heating-stoves, bath water-heaters, &c., is then dealt with, and finally progress in gas-engine construction is referred to.

The book concludes with a good subject-index and an index of names. It is a compact quarto volume of 127 pages, and there are 56 illustrations.

FINANCIAL SUPERVISION OF GAS UNDERTAKINGS

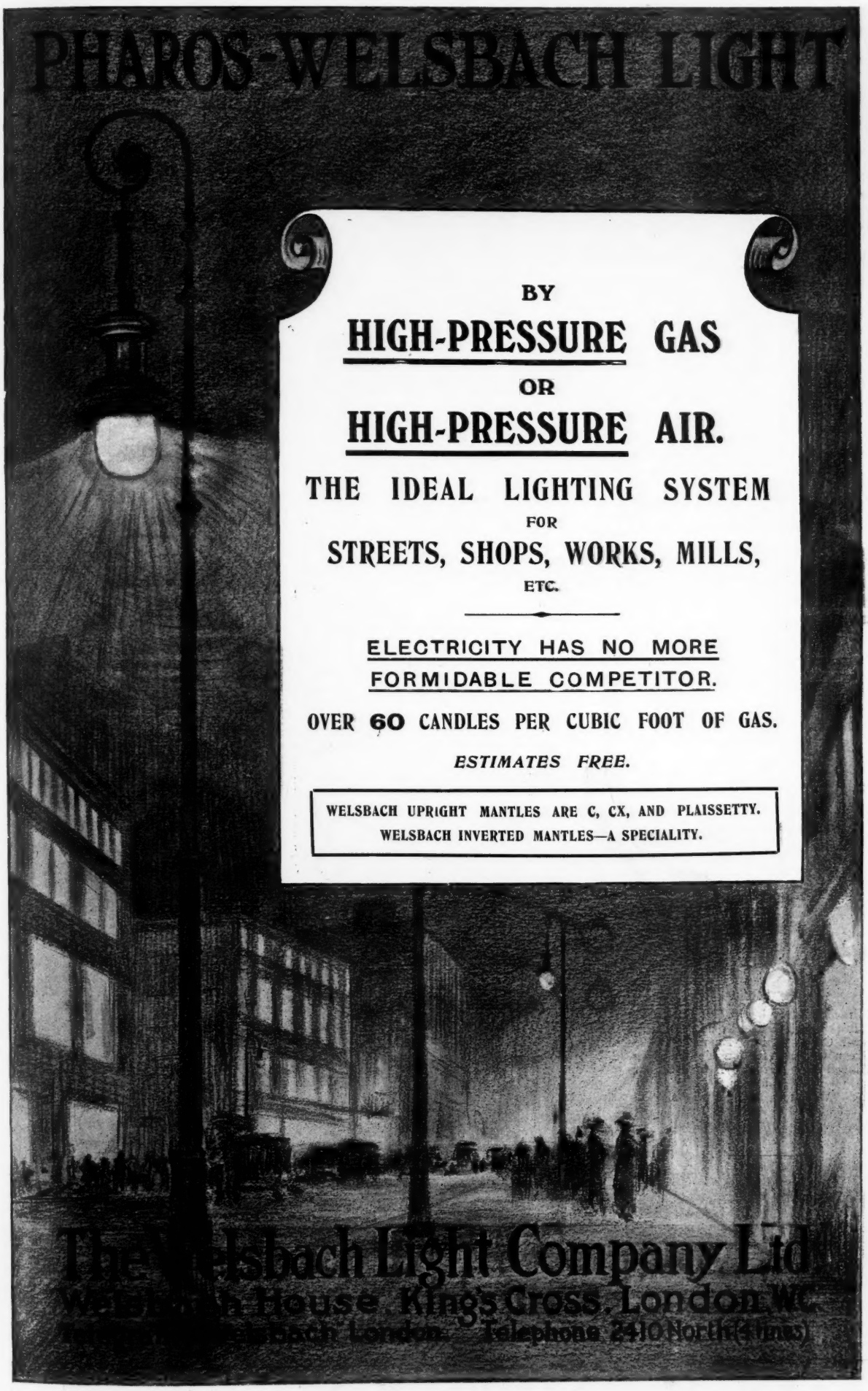
IT is not long since we had the pleasure of noticing a small volume by Dr. Greineder, who is the superintending engineer at the Cologne Gas-Works, on "Book-Keeping for Gas-Works." [See "JOURNAL, Vol. CX., p. 22.] We now have before us another small volume by the same author in which he supplements his former work in the direction of the financial supervision of gas-works.* Both volumes are concerned with works' accounts and finances only, and not with the general finances of a gas supply undertaking.

The author, in his later work, proceeds at the outset to demonstrate the importance and necessity of careful financial supervision of gas-works, and gives three grounds for exercising it in particular at the present time: (1) The rapid extension of gas undertakings, (2) their brisk economical development, and (3) the advantage of comparing the economy of working of different undertakings. He then goes on to give examples of schemes of keeping statistics and books as used at the present time for superintending, from the financial side, the working of existing fully developed gas undertakings. The examples relate to the works' accounts and balance-sheet, the calculation of prime cost, and special statements to facilitate the supervision of the wages' sheets, the maintenance charges, and the whole administration. The next section gives some new proposals for the effective financial control of gas undertakings; and in it the author discusses the principles underlying schemes of rational superintendence, and then the schemes in detail. In the third section, publicly owned gas supply undertakings are specially considered; a scheme of book-keeping being given, so as to furnish the works' accounts, profit and loss account and balance-sheet, and with the object of computing the prime cost of the gas. Then follow the special administrative accounts for similar undertakings. The fourth and last section is devoted to the importance of a uniform scheme of statement of accounts current for all gas-works.

Dr. Greineder's volume should prove suggestive to all concerned with the accounts of the working and management of gas-works, and especially of works which, like the majority of the gas-works in Germany, are owned by public authorities. In the case of works owned by companies, ordinary commercial methods of checking the economy and efficiency of working generally prevail, and appropriate sums are written off periodically to cover depreciation of plant. But the working of municipal undertakings is not always so closely supervised from the financial standpoint; and Dr. Greineder does good service in calling attention to the growing importance of such supervision, in view of the increase in the magnitude of the operations of such undertakings.

A signed review by the late Dr. E. Blum of Dr. Greineder's volume is published posthumously in the "Journal für Gasbeleuchtung" of the 11th inst. Dr. Blum states that it was at his suggestion that the work was undertaken, primarily as a thesis for the Doctorate of Engineering, which was conferred therefor on the author by the Technical College of Aix-la-Chapelle. The thesis, after revision, has been published in the form of the volume now before us. Dr. Blum attaches great importance to the systems of book-keeping suggested, since they admit of the financial aspect of the working of each section of a gas-works being rigorously observed, as well as the working of the whole undertaking. Dr. Blum speaks favourably of the detailed working accounts which are published by the Amsterdam and Zürich gas undertakings, and expresses the hope that Dr. Greineder's work will lead to some of the large municipal gas undertakings in Germany which do not at present issue similar detailed and sectional accounts, following the example of Amsterdam and Zürich. The light which would thereby be thrown on the economy of the working of the different sections of a gas-works would result generally in a reduction of the prime cost of gas being effected.

* "Die finanzielle Überwachung der Gaswerksunternehmen," von Dr. Ing. Friedrich Greineder, Betriebsingenieur der Gaswerke Köln a. Rh. Munich and Berlin: R. Oldenbourg; 1911.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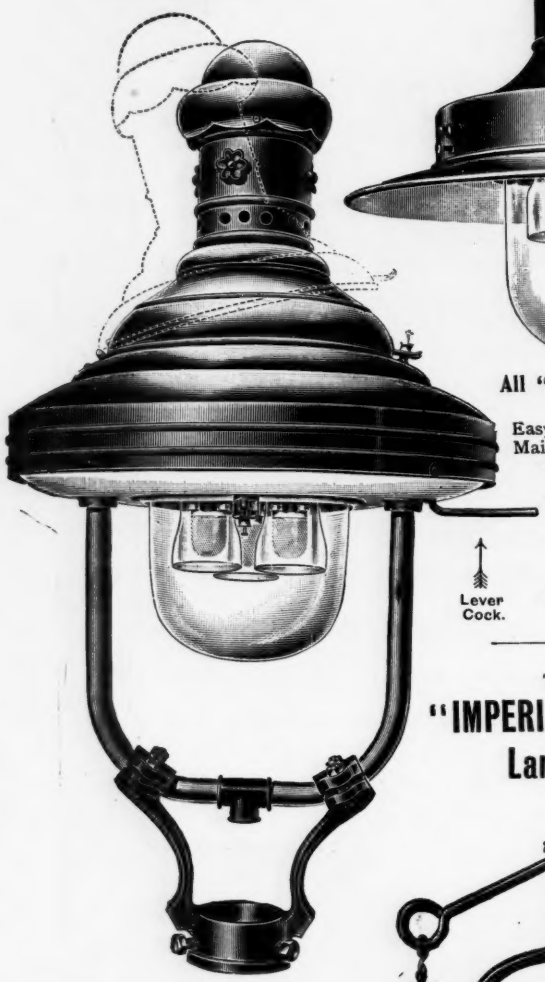

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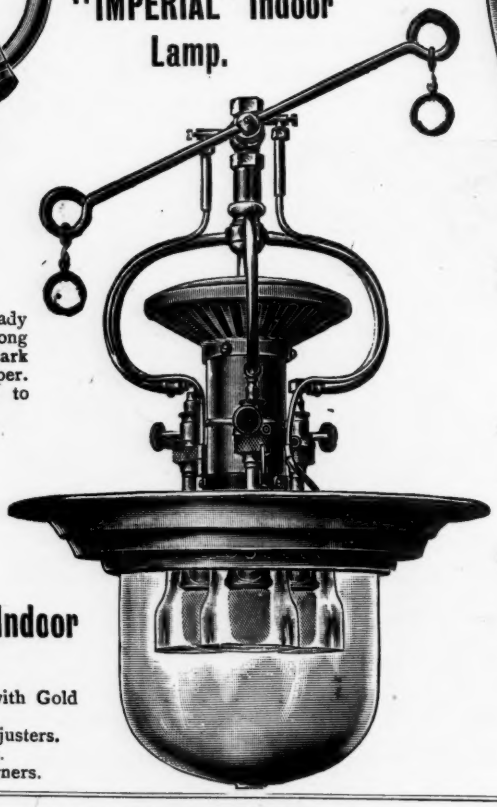

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AMERICAN COMMERCIAL GAS ASSOCIATION.

Notes of Proceedings.

[From a Correspondent.]

A notice appeared in the last issue of the "Journal" (p. 444) of the recent Convention, in Denver, of the National Commercial Gas Association of America; and we to-day complete our correspondent's account of the business portion of the proceedings. Abstracts of the Presidential Address and of the papers read will be found on pp. 465-68 and pp. 534-6.

President Stannard, in his address, reviewed the work of the various Committees, stated that where the public were fairly dealt with there would be no demand for municipal control or ownership, and recited some of the matters which the Association should take up for the benefit of members. Much of this work could not be done without more funds; and therefore he advocated company membership (a plan by which a gas company, on payment of an annual sum, dependent on its size, would, as a company, secure certain privileges). He also recommended the Association "to take on added responsibilities . . . . . greatly broadening its scope of work, becoming of greater value to . . . . the broad gas industry." If this means that the Association intend to encroach on the engineering field of the Institute, it is to be hoped the movement will be checked. Otherwise, there will again occur the duplication of work, to avoid which the Institute was founded. The address was referred to a Committee of three; and following this, the Committee on Time and Place reported for Atlanta, Georgia, and their choice was confirmed.

A paper was read on "Illuminating Engineering and its Application to the Gas Industry," by Mr. E. Leavenworth Elliott, who is probably known to your readers as the Editor of the "Illuminating Engineer." He presented data regarding the lack of attention paid to illuminating engineering by gas companies in general, and predicted the rapid loss of important lighting business if this indifference is continued. Though his conclusions were vigorously attacked in the discussion, no convincing refutations of his statements were given. "Some Notions of a Manufacturer," by Mr. Robert K. Clark, was a direct appeal to salesmen to sell always the type of range best adapted to give permanent satisfaction, and to gas companies to avoid too minute and rigid specifications in purchasing ranges.

Then followed one of the most interesting and significant papers of the meeting—"Pensions and Profit-Sharing," by Mr. James B. Douglas, the Manager of the Claim Department of the United Gas Improvement Company. It was a brief description of the profit-sharing and pension systems that have been adopted by some of our largest railroad and industrial corporations. Among these is the Boston Consolidated Gas Company—the only gas company in this country operating under the sliding-scale. In the discussion, Mr. E. N. Wrightington, Secretary of the Boston Gas Company, spoke in favour of profit-sharing, and mentioned the recent election of a workman-director. Thus from Old to New England has been transplanted complete Sir George Livesey's masterly solution of labour troubles.

Next came a special report from the Committee on Relations with Manufacturers, as a result of which a Committee was appointed for the purpose of standardizing the specifications for gas-ranges. After this, Mr. A. F. Traver gave an exhibit and description of a model glass gas-works. About 10 cubic feet of gas were made, and its visible passage through the various apparatus to the holder was very interesting indeed to the audience. In "Up-to-Date Advertising Methods," Mr. T. R. Elcock described the knowledge requisite to make gas advertising a success. This was followed by "Practical Demonstration" by Mrs. Anna A. Carroll, who, from her own experience, related the qualities needed for a successful demonstrator of the use of gas for cooking. The paper was praised in the discussion. Mr. S. Gulbrandsen spoke on the "Manufacture of Gas-Mantles from Artificial Fibres;" and everyone was much impressed with the toughness of the silk mantles exhibited, and appreciated the assistance they will render in extending the field of incandescent gas lighting.

The Committee on Amendment to Constitution reported an amendment which permitted company membership. This was adopted; and then the Committee on the President's Address made their report. This congratulated the President on having recommended company membership, and the Association on having adopted it, and predicted that, with the additional funds thus secured, the Association would be able to cope successfully with the large amount of work looming ahead. Here it might be said that company membership has been in vogue among a few other technical associations—notably the National Electric Light Association—for some time past. It has, however, never seemed to find favour with the Gas Associations, possibly because it entails a loss of control by the individual member, who becomes subordinate to the company member. After these Committee reports, came two presentations of specially made diamond-set badges of the Association—one to Mr. Richard E. Slade, as the first presiding officer, and the other to Mr. Lucius S. Bigelow, as a further token of the Association's regard.

A paper on "Increased Efficiency in Scientific Office Accounting," by Mr. Paul R. Jones, was a forceful argument for care in office work in selecting the right man for the right place, and for providing him with all available labour-saving devices. After this a contribution on "Ventilation of Fuel-Gas Appliances" was read by Mr. James H. Walker. The author, recognized as a leader in fuel-appliance design, is a strong believer in a flue connection to every fuel-gas appliance. As current practice in this country usually does not provide a flue for the ordinary domestic range, or for small circulating water-heaters, there were many dissentients heard from in the discussion.

Mr. Charles E. Ummach dealt with the "Modern Gas-Fixture." He stated that the electric interests had always co-operated with the fixture manufacturers in improving electric fixtures; and he asked for a similar co-operation on the part of all gas companies on behalf of gas-fixtures. A development which may follow from this paper will be an attempt to standardize certain points of fixture construction. In this country, many cities or gas companies, by virtue of law or custom, exercise a rigid supervision over gas-piping and fixture work; and unless the work passes certain inspections, a gas supply will not be furnished. It is now proposed to harmonize as far as possible these various requirements as they may concern fixture construction. This will be a gain for fixture manufacturer and gas consumer alike. The last set paper was on the "Relative Cost and Efficiency of Gas, Electric, and Gasoline Lighting," by Mr. W. M. Blinks. The most important point brought out in the discussion was that most of the tables quoted by the author referred to conditions both foreign and past. Then came a masterly abstract of Professor W. A. Bone's lecture on "Surface Combustion," as delivered before the American Gas Institute. This was prepared by Mr. C. O. Bond, and it was equally enjoyed by hearers as by non-hearers of the original lecture. After this, with the usual resolutions of thanks to officers and Committees, the meeting finally adjourned.

Now for a word about the appliance exhibition. There were fifty exhibitors, occupying a space of about 150 feet square. The exhibits were attractively arranged and decorated; and the exhibitors are said to be pleased with actual and prospective business gained. The exhibition, being under the same roof as the meeting hall, was a favourite gathering-place. It was lit by more than fifty five-burner inverted gas arcs. Lights of the same type were used to illuminate the streets adjoining the convention building and the gas company's office.

After business came pleasure, in the shape of some excellent excursions. In fact, socially the meeting was an unqualified success. From a business standpoint, however, its value was somewhat lessened by the facts that, though 500 members registered, at no session except the opening one were there over 150 present, and that much time was lost by tardiness in assembling.

WATER LEGISLATION FOR 1911.

[Third Article.]

We conclude to-day the notice of the Acts containing provisions in regard to the supply of water which have been obtained this session by public bodies.

The Metropolitan Water Board have been authorized to construct water-works, make roads and junctions, and carry out other important works. The Bill provided for making eight storage reservoirs, to be situated in the parishes of Wraysbury, Staines, Datchet, Horton, Stanwell, Laleham, Littleton, Shepperton, and Sunbury; a service reservoir on Horsendon Hill, Greenford, and another on Barn Hill, Wembley, in the county of Middlesex; and the construction of a number of aqueducts, conduits or pipe-lines, and cuts. As readers of the "Journal" may remember, the Bill encountered severe opposition; and it was the subject of a long inquiry by a Joint Committee of the two Houses of Parliament. As eventually passed, the promoters' proposals were considerably modified. The Act authorizes the construction of a storage reservoir partly in the parish of Stanwell and partly in the parish of Staines, two others on sites in the parishes of Laleham, Littleton, Shepperton, and Sunbury; the two service reservoirs—on Horsendon Hill, Greenford, and Barn Hill, Wembley respectively—proposed in the Bill; fourteen aqueducts and a similar number of pipe-lines; and a cut commencing at the south-east of Penton Hook Lock, and terminating in a pumping-station proposed to be constructed in the parish of Laleham. Power is given to the Board to divert streams, construct subsidiary works, make, stop up, and divert roads and footpaths, alter the position of mains, and, where necessary, underpin houses. A period of fifteen years is granted within which to complete these works; being ten years less than the promoters required for carrying out the larger scheme embodied in the Bill. Authority is given to the Board to acquire lands in the parishes of Stanwell and Staines for the construction of filter-beds and other purposes; and their powers, as successors in title of the Southwark and Vauxhall Water Company, for the completion of the pumping-station at Walton-on-Thames, and the aqueduct, conduit, or pipe-line described in the Company's Act of 1898, are revived and continued, and may be exercised until the expiration of one year from the passing of the Act. In the Bill, the Board asked for three years. Subject to the provisions of the Thames Conservancy Act of the present session [noticed later], and of any amending Act to be hereafter passed, the Board are empowered to take from the Thames such quantities of water as they may from time to time require, and utilize them for the purposes of their undertaking. As soon as reasonably practicable,

the outer slopes of the external banks of the reservoirs authorized by the Act, and also of those at Staines, are to be "planted with shrubs and trees in such numbers and position, and of such character, as may be necessary and practicable for reasonably preserving the local amenities;" and the Board are to maintain and renew them whenever necessary. Authority is given for borrowing the following amounts: For the purchase of lands and the execution of the works sanctioned by the Act, £4,100,000, to be repaid within sixty years; and for works to be carried out under the general powers of the Board, £1,000,000, to be repaid within thirty years. The Board may also borrow, with the sanction of the Local Government Board, such further sum as may be required for the purposes of the Act, and (without such sanction) the amount necessary for paying the costs and expenses incurred in obtaining it. The latter is to be repaid within five years from the passing of the Act; and the former within such period as may be fixed. The Act contains a large number of protective provisions, as might be supposed from the magnitude of the works authorized. [*Parliamentary Agents: Messrs. Dyson and Co.*]

The Urban District Council of Oystermouth have obtained authority to purchase, by agreement or arbitration, the undertaking of the Oystermouth and District Water-Works Company, Limited, maintain the existing works and construct others, and supply water within the urban district of Oystermouth and some adjacent places. If the purchase is not completed on the appointed day, the Council are to pay to the Company interest at the rate of 4 per cent. per annum on the purchase-money until completion. The new works for the construction of which authority is given are a service reservoir in the parish of Oystermouth; a conduit or line of pipes commencing in the parish of Bishopston, in the existing pumping-stations of the Company, and terminating in the reservoir just referred to; and another pipe-line commencing at or near the Redley springs of the Company, and terminating at the existing pumping-stations. Authority is given to purchase the sites of these stations and the easements for certain lines of pipes. The rates for the supply of water for domestic purposes are to be 8s. 8d. where the rateable value of the premises does not exceed £5 per annum; 10s. where it is not more than £7; 12s. when not above £10; and 7 per cent. on the rateable value when this exceeds £10. When the supply is by measure, the price is not to be more than 1s. 6d. per 1000 gallons. The Council may take water in bulk from the Swansea Corporation and other bodies; and supplies in bulk beyond their limits are to be furnished on such terms as may be agreed upon. The other powers granted to the Council are of the usual character. They are authorized to borrow for the purchase of the undertaking of the Company, and for defraying the costs and expenses incidental thereto, such sums as may be necessary; for the purchase of lands and easements and for the construction of the reservoir and conduits specified, £4650; for the extension and improvement of the water undertaking, £2800; for the supply of fittings and working capital, £1000; and whatever amount may be needed to defray the costs and expenses of the Act. Fifty years are allowed for the repayment of the purchase-money; sixty years for the £4650; and thirty, ten, and five years for the three other sums mentioned. [*Parliamentary Agents: Messrs. Durnford and Co.*]

The Paignton Urban District Council Act authorizes the Council to construct water-works, consisting of a filter-house and filters in the parish of Holme; another, with filters, near the dam of the Council's Venford reservoir; and an aqueduct, conduit, or pipe-line commencing in the parish of Holne, and terminating in the parish of Ipplepen, by a junction with the existing main leading from the reservoir to Paignton. The Council are granted ten years for the completion of the works. They are not to be compelled to furnish a supply of water for domestic purposes for less than 8s. 8d. in any one year, nor to any dwelling-house, or part thereof, of which the rateable value amounts to or exceeds £15, for any less period than six months. They may supply water by measure at a price not exceeding 1s. 6d. per 1000 gallons, with a minimum not higher than 10s. per quarter. Authority is given to borrow for the purchase of land for the works specified and the construction of the works an amount limited to £27,500; and the Council are allowed sixty years within which to repay it. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Rhondda Urban District Council Act grants the Council an extension, by three years from the passing of the Act, of the time limited by the Council's Act of 1905 for the carrying out of certain works specified in the Ystradyfodwg Urban District Council (Gas and Water) Act of 1896, and also gives them authority to construct new works, comprising two service reservoirs and filter-beds in the parish of Rhondda, a tank adjacent to the Council's Tyn-y-waun reservoir, and four aqueducts, conduits, or pipe-lines. Seven years are allowed for the completion of these works. Authority is given to raise £34,667 in respect of the works for which the extension of time named has been obtained, and £48,209 for the purchase of land and carrying out the new works. A period of forty-five years is granted for the repayment of these amounts. [*Parliamentary Agents: Messrs. Torr and Co.*]

By the Rotherham Corporation Act the Corporation obtain authority to construct a service reservoir on certain lands lying to the south of the Wortley Road, in the parish of Rotherham, and a period of ten years within which to complete it. The Act repeals the portion of the section of the Rotherham and Kimberworth Local Board of Health Act, 1863, which prescribes that the Corporation shall not be entitled to demand or receive in respect of water-rates for any one dwelling-house or part of a dwelling-house any higher sum than £10. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

An Act obtained by the Slough Urban District Council gives them authority to acquire the undertaking of the Slough Water Company, maintain and enlarge the existing works, and make better provision for the supply of water in the district. Within six months after the passing of the Act, the Council are to serve upon the Company notice of their intention to purchase; and in settling the amount to be awarded to the Company, 10 per cent. is to be allowed as compensation for compulsory sale and the cost of re-investment. A sum of £1000 is to be paid as compensation to the Directors, and provision is made for the compensation of the officers. The minimum rate for the supply of water for domestic purposes is to be 8s. 8d. per annum. The Council may raise the necessary money to complete the purchase and pay the costs and expenses incidental thereto. The former amount is to be repaid in forty-five years from the date or dates of borrowing, and the latter within five years from the passing of the Act. The Council may also sell a portion of their undertaking to any outside local authority whose district is within the area of supply. [*Parliamentary Agents: Messrs. Baker and Co.*]

In a General Purposes Act obtained by the St. Helens Corporation, they have been authorized to require security for the supply of water, and to recover in the same way as water-rents expenses incurred in the repair of meters, &c. It is specified that a supply of water for domestic purposes is not to include a supply to stables or premises in which horses, carriages, or motor-cars are kept for private use, if a hose-pipe or other similar appliance is used for such stables or premises. Where it is so used, an additional sum not exceeding 20s. per annum may be charged. Other provisions in the Act relate to the detection of waste, the supply of water to houses partly used for trade, &c. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Swinton Urban District Council Act confers upon the Council authority to maintain their existing water-works and construct additional works, consisting of a well, pumping-station, and filter-beds, a conduit or line of pipes, and an enlargement of the existing storage reservoir; and they are allowed ten years for their completion. Power is given to supply water by measure, revise the present water-rates, sell or let meters, make provision for the detection of waste, and hold lands for the protection of the water-works. Permission is granted to borrow any sums not exceeding £10,000 for the purchase of land and the construction of works, to be repaid within fifty years. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Conservators of the River Thames have obtained an Act for the amendment and the consolidation of the various enactments relating to the abstraction of water from the Thames by the Metropolitan Water Board, and to the payments made by the Board to the Conservators in respect thereof. As from the commencement of the Act, the Board may take from the river in one day any quantity of water not exceeding 1200 million gallons; but the daily average is not to exceed in any year 300 million gallons. The conditions under which the water is to be taken are fully specified. The Act contains a special provision applicable pending the completion of additional storage works. The Board may take gravel water at any time when the actual flow of water over Teddington Weir amounts to, or exceeds, the rate of 170 million gallons per day, but not when it is below this quantity. In case of emergency, however, they may, with the sanction of the Local Government Board, draw on the river even under the latter conditions. They are to cease or reduce pumping on notice being given; and alterations of their intakes are to be subject to the sanction of the Conservators. Provision is made for ascertaining the quantities of water taken from the Thames and the flow over the weirs; also for the maintenance of the head-water in the reaches. Protection is given to the Woking Water and Gas Company, the Middlesex and Surrey County Councils, and the Port of London Authority; and nothing contained in the Act is to prejudice or affect the right of the South-West Suburban Water Company to take water from the Thames in pursance of their Act of 1908. [*Parliamentary Agents: Messrs. Wyatt and Co.*]

Authority from Parliament was sought for the establishment of a Water Board for the Rhymney Valley, and for power to acquire the water-works undertakings of the Rhymney and Aber Valleys Gas and Water Company, the New Tredegar Gas and Water Company, Limited, the Rhymney and Caerphilly Urban District Councils, and the St. Mellons Rural District Council, and the Pentwyn reservoir and other works of the Merthyr Tydfil Corporation. The project was, however, strongly opposed; and the Bill was rejected.

Checking Labour Union Intimidation.—As a practical step towards protecting employers and any willing workpeople against molestation and intimidation by labour union pickets during disputes and strikes, the Liberty and Property Defence League have organized a system of counter-picketing, and can supply at short notice adequate numbers of trained men, who have served in the naval, military, and police forces, for the purpose of resisting the tyranny of the Trade Unions. The League is prepared to send fully experienced ex-police officers to provincial centres to locally organize special police protection, and by prompt action make the freedom of labour safe and the rights of employers secure. Employers and others who desire to avail themselves of the services of the League in this respect should communicate with the Secretary (Mr. F. Millar), 25, Victoria Street, London, S.W.

THE KITLEY-NATIONAL LAMP

With Automatic Regulator and Air-Shutter.

Lamps of the high-power low-pressure type enjoy a large share of well-deserved popularity; and numerous examples of this form of gas lighting have been noticed in the pages of the "Journal." This being so, no apology is needed for drawing attention to the Kitley-National automatic arc lamp, the main features of which were last week pointed out to us by Mr. H. Kitley, who is the Manager to Messrs. Moffat's Limited, of Farringdon Road, E.C., who supply the lamp.

The Kitley-National Automatic Lamp.

The lamp to which reference is now made is for interior lighting; and the standard for this type consists of a five-light cluster of inverted burners, so arranged as to occupy the smallest practicable amount of space. Indeed, one may say that the most striking thing about the lamp, at first sight, is its diminutive size—measuring, as it does, no more than 19½ inches over all. And it is not only small, but neat also. When seen out of use in broad daylight, it has an attractive appearance, finished in white enamel, with nickel-plated fittings—which, by the way, are found to stand well the test of lengthy use. Two, three, and four light clusters can also be had; and the casing is precisely the same as for the five-light. All the burner-heads are interchangeable; and all that has to be done is to slip on to the mixing-tube the fitting containing the particular number of nozzles required. The efficiency claimed, it may be remarked, is about 110 candles per burner with a consumption of 3 cubic feet of gas per hour.

On inquiry as to the working parts of the lamp, it is learnt that there are two main features. The first of these is absence of carbonization at any pressure. There is provided in connection with the gas-nipple an automatic regulator, which adjusts itself, within very wide limits, to the prevailing gas pressure; and there is also fitted a reducer to govern the air supply. The correct amount of gas is delivered, and its velocity is equalized—thus ensuring uniformity of air induction. For various gases, there are different sized reducers and regulators; and having once obtained the best result with a particular gas, the size of reducer and regulator which is found best suited to secure it is fitted to all the lamps which may be dispatched to the district in which the gas is supplied. According to the number of burners in the lamp, the gas supply is regulated by means of a screw (provided with a lock-nut) in the bottom of the fitting. A collar fitting down well over the nozzles gives a self-intensifying effect without the use of inner chimneys. The mixing-tube, on the top of which the burner-head is slipped, is arranged in such a way that there is a direct upward feed of gas, working in accordance with the law of gravity; and the mixture is superheated in the burner-head, just before delivery to the mantles, so as to increase the luminosity. The second feature is an automatic air-shutter, for avoiding explosive mixtures when lighting or extinguishing, and thus saving wear and tear of the mantles. This is so arranged that, on turning on the main gas supply, the air supply is not opened until the gas has been lighted at the nozzles by the pilot. A single pull of the chain first turns on the gas, then (after the briefest interval) the air, and lastly extinguishes the bye-pass. On turning off the gas supply, the sequence of events is reversed—the pilot is lighted, the air is shut off, and then the main gas supply is closed. The lighting and extinguishing are thus performed in an even manner.

The cost of maintenance should be agreeably small; for the lamp is simple in construction, and can be attended to easily and quickly. The adjustments are outside; and the mechanical parts are away from the heat. The globe is shaped with the idea of distributing the light where it is most needed; it is open at the bottom, and not hung. As will be seen in the illustration, it is supported by a cap—thus giving the advantage of the closed-bottom globe without any disadvantage. There is also ample provision for the free circulation of fresh air in the lamp—which is insect proof. In conclusion, it may be stated that an outdoor lamp on the same principle will shortly be introduced.

ILLUMINATING ENGINEERING SOCIETY.

A Record of Progress.

At the Opening Meeting of the Third Session of the Society, which took place at the rooms of the Royal Society of Arts, Adelphi, last Friday evening, the Hon. Secretary (Mr. Leon Gaster) gave a summary of the progress made during the vacation, in the course of which he referred to the following matters.

Committees on School and Library Lighting.

After the discussions on school and library lighting last session, it was decided to form two Sectional Committees dealing with these subjects. During the vacation a number of gentlemen were approached to act in this capacity; and the practical co-operation of the Library Association, the Association of Medical Officers in Schools, the Association of Technical Institutions, the Association of Teachers in Technical Institutions, and the London Teachers' Association was secured. Representatives were nominated by these Associations; and it was hoped that these Committees would act as a permanent centre of information, and presently have a record of valuable work to bring before the Society. Among the members of the School Lighting Committee are Mr. F. W. Goodenough, the Controller of the Sales Department of the Gaslight and Coke Company, and Mr. A. Stokes, of the South Metropolitan Gas Company.

Standard Street Lighting Specification.

The Joint Committee, on which representatives of the Institutions of Gas and Electrical Engineers, the Association of County and Municipal Engineers, and the Illuminating Engineering Society, have been nominated, are continuing their meetings, and a considerable amount of data has already been collected. During the vacation, several articles on this subject appeared in the "Illuminating Engineer;" and the results of a series of inquiries sent to corresponding members on the Continent and in the United States were collected and presented in tabular form.*

Hospital and School Lighting.

At the invitation of the Royal Sanitary Institute, the Society nominated the President, the Hon. Secretary, Mr. J. Eck, and Mr. J. Darch to be present as delegates at the congress in Belfast, at which a paper was presented by Mr. Darch on the subject of "Hospital Lighting;"† while one read by Mr. W. H. Webb contained some notes on "School Lighting." In the latter, special reference was made to the suggestions on the subject put forward at the meetings of the Society during the past session; and they were recommended to school officers for special consideration.

Dresden Hygienic Exhibition.

The International Hygienic Exhibition at Dresden was visited by Mr. J. Eck on behalf of the Society, which was also represented locally by Professor Dr. Ulbricht and Drs. Schanz and Stockhausen. At the suggestion of the Society, some exhibits dealing with illumination were despatched to the exhibition, including photographs, taken by artificial light, showing the condition of illumination in various gas-lighted schools, by the Gaslight and Coke Company, in various factories lighted by high-pressure gas by the James Keith and Blackman Company, and of interiors illuminated by arc lamps by the Union Electric Company.

French Committee on Hygienic Aspects of Lighting.

An important step has been taken by the French Government in appointing a Committee, on which prominent oculists and physiologists, engineers, and factory inspectors are represented, to inquire into the hygienic aspects of lighting. This Committee includes within its reference the framing of standards of illumination, for industrial purposes, and of simple rules on illumination, the nature and causes of defects of vision, and their relation to lighting conditions, the measurement of illumination, &c. The attention of the authorities in this country has been drawn to this Committee; and the Hon. Secretary, on the occasion of his recent visit to the Continent, took the opportunity of learning the views of various influential corresponding members of the Society and Governmental Departments abroad regarding possible future legislation affecting the lighting of factories, &c. It is hoped that the precedent established by France will shortly

* See "Journal," Vol. CXV., pp. 99, 661.

† This paper was noticed in the "Journal" for Aug. 1 last (p. 297).

be followed in other countries. The evidence given before the recent Departmental Committee on Accidents in Factories and Workshops in this country strongly emphasized the need for more definite recommendations on lighting as a means of avoiding accidents and for the safeguarding of dangerous machinery. It was suggested that meanwhile inspectors should be given general statutory power to require adequate illumination. It is understood that the Home Office is now giving this matter very careful attention, and has arranged for tests to be made and evidence collected bearing on this point.

International Electrical Congress in Turin.

At the International Congress of Applied Electricity in Turin, the Society was represented by the President and the Hon. Secretary. The latter read a paper dealing with "The International Outlook in Scientific Illumination" [see *ante*, p. 116]; urging that some attempt was needed to co-ordinate the efforts of the various National and International Committees dealing with illumination, so that there might be some common plan of action. In accordance with this suggestion, the following resolution [*ante*, p. 242] was proposed and carried unanimously at the meeting on Sept. 16:

> That this congress deems it desirable that an International Commission should be appointed in order to study all systems of lighting and technical problems in connection therewith; and, having been informed that the Illuminating Engineering Society of London has the intention of forming such a Commission, and of putting itself in touch with the other existing National and International Committees, approves their taking the initiative in this respect.

This resolution, and also one passed by the International Electro-Technical Commission, to the effect that the National Committees should co-operate with the Illuminating Engineering Societies in their respective countries in studying the question of symbols, nomenclature, and other matters relating to illumination, is considered to afford gratifying evidence of the recognition already gained by the international and impartial status of the Society; and hope was expressed that the other older established societies and institutions interested in this subject will give their cordial support in forming the proposed International Commission.

Lectures on Illuminating Engineering.

In conclusion, reference was made to the courses of lectures on "Illuminating Engineering" which have been organized at the Regent Street and Battersea Polytechnics and the Northampton Institute, two of which [those at the first-named places] have been commenced. These lectures, particulars of which have been given in the "Journal," are intended as a preliminary to more complete courses in the future. But a new precedent has been set in the organization of a course in which the various sections of the subject—gas and electric lighting, photometry, &c.—are dealt with by lecturers who make a special study of their departments.

Rusting of Cast and Mannesmann Tubing.—In the current number of the "Journal of the Society of Chemical Industry," reference is made to an article on this subject in "Métallurgie." Cast iron and steel and Mannesmann tubes were enclosed in a moist oxygen atmosphere, and the absorption of the gas measured in order to determine any difference in the degree of rusting that took place. The tubes were previously sand-blasted and washed in water, alcohol, and ether. The results obtained varied; and only further work can determine whether this variation depends upon the character of the external surface of the tubes or upon any unfavourable conditions of the experiments.

South Metropolitan Gas Workers and the Insurance Bill.—In the House of Commons last Thursday, Captain Morrison-Bell asked the Chancellor of the Exchequer whether it was proposed by amendment to allow companies such as the South Metropolitan Gas Company, as well as railway companies, to contract out under the National Insurance Bill. Mr. M'Kinnon Wood, answering the question for Mr. Lloyd George, said he must refer the hon. member to the answer given on the 14th of August to the hon. baronet the member for Wandsworth (Sir Henry Kimber). He added, however, that the Home Secretary had arranged to meet representatives of the Company, and discuss the position with them. We learn that the interview took place the same afternoon, and that no encouragement was given to the deputation to expect that any proposal to contract-out of the Bill would be favourably entertained by the Government.

Opening and Closing Vertical Retorts.—Mr. J. H. Taussig, of Philadelphia, has taken out a patent in the United States for means for opening and closing from the operating platform the doors at the bottom of vertical retorts, without requiring the presence of an attendant beneath the retorts. According to an abstract of the specification in the "Journal of the Society of Chemical Industry," each door is connected by a pivot device with a horizontal lever by which it may be lowered to open the retort, or raised to close it and press the door against its seating. This lever is worked by a cable acting on a quadrant arm which forms a bell-crank with the horizontal lever. The quadrants are arranged outside the setting, and the cables are run to the operating platform, and are worked by rods moving vertically which may be clamped in any desired position. These rods are raised by means of an overhead travelling hoist, through a spring connection which has a scale to indicate when the closing pressure is sufficient.

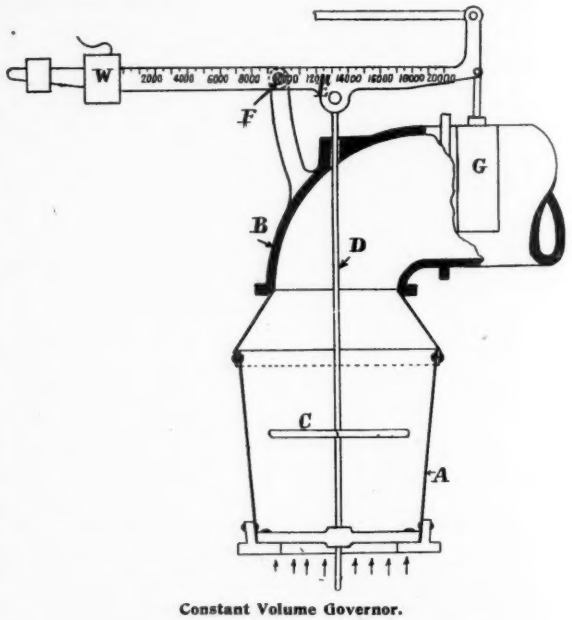
CENTRIFUGAL COMPRESSORS IN GAS-WORKS.

In a paper submitted by Dr. L. C. Loewenstein to the members of the American Gas Institute at their last annual meeting, he directed attention to a somewhat recent improved air-compressor, which, it is claimed, has, among other advantages, a much higher efficiency than any similar apparatus hitherto used; and also to a comparatively new method of controlling the supply of air to gas apparatus, thereby securing an increased and more uniform output. The paper contained several illustrations of the appliances referred to.

The first machine described was a turbine-driven centrifugal compressor capable of delivering 10,200 cubic feet of air per minute against 1 lb. pressure, supplied by the General Electric Company to the Springfield (Mass.) Gas Company. It is connected to a Curtis steam-turbine, which runs at a normal speed of 3450 revolutions per minute. The entire unit has only two bearings; the compressor impeller being supported between them, and the turbine wheels being overhung at one end. As the pressure delivered by a compressor is directly proportional to the speed of the impeller, practically constant pressure is maintained, no matter what the volume of discharge, if the turbine is kept running at constant speed. In order to change the pressure to be delivered by the set, the turbine can be speeded-up or slowed-down so that the machine can be said to force air or gas against a constant resistance or pressure no matter how varying the quantity demanded. Another centrifugal compressor, directly connected to a steam-turbine, was capable of delivering 4200 cubic feet of air per minute against 2 lbs. pressure. This set runs normally at 3450 revolutions, and was supplied to the United Gas Improvement Company, Philadelphia. In general design it is similar to the set previously described; the only changes being that the air intake and discharge are set at 90° to each other, instead of being opposite. Attention was next directed to two centrifugal compressors driven by induction motors, furnished to the New Amsterdam Gas Company of Brooklyn (N.Y.); each set being equal to delivering 3600 cubic feet of air per minute against a pressure of 0·9 lb.

The compressors described were units constructed to operate against a constant resistance or pressure. The author pointed out, however, that there are cases in which the air should be delivered with constant volume against a continually varying pressure. These appliances are known as "constant volume" compressors. As far as the compressor is concerned, the constant volume unit is exactly the same as the constant pressure unit. The only thing necessary to change the latter set into one of the former kind is to add a constant volume governor which automatically controls the speed of the driver—thus varying the pressure delivered by the unit, and maintaining a constant volume of air delivered.

To this type of apparatus the author next directed attention, because of its application in the manufacture of water gas. It is shown in the accompanying diagram.



Constant Volume Governor.

The governor is placed on the intake end of the compressor. The air is admitted through a conical pipe A into an elbow B connected directly to the inlet flange of the compressor. In this conical pipe is mounted a horizontal float C, suspended from a vertical rod D. The latter is connected to a beam E, which is free to move about a pin support F. The beam is graduated to indicate the quantity of air in cubic feet per minute which the compressor will deliver if the sliding weight W is placed at any certain

graduation. An oil dashpot G is attached to one end of the beam to check too violent oscillations.

The method of operation of the governor when furnishing air to the gas-making apparatus is as follows: Supposing 14,000 cubic feet of air are to be delivered to the generator and carburetter, the sliding weight is set at the graduation marked 14,000, and the float will then assume a definite position in relation to the conical pipe. Assuming that the above-named quantity of air is being delivered under the pressure of 0·75 lb., if at any time the fuel in the generator becomes more densely packed, or if the generator is slowly beginning to get into bad condition by the formation of clinker, the resistance to the flow of air through the generator is increased. With this increased resistance, the compressor cannot continue to deliver 14,000 cubic feet of air. As soon as this occurs, the float can no longer keep in position, because it is not sustained by the original volume of air passing by it. As the volume of air decreases, the float will begin to drop; and then the rod D will draw the beam into a new position. The end of the beam is connected (as shown) with the governing mechanism of the driver; and no matter what form of driver is used, its speed will be increased, so that the compressor will run at a higher rate and deliver greater pressure. The pressure will continue to increase until it is sufficiently high to overcome the added resistances in the generator, and again force the original quantity of air through the apparatus. The governor, therefore, will instantly respond to any change of conditions, so that if the resistance to the passage of air is increased, the speed of the compressor will also increase and overcome the resistance; and when this is removed, the compressor will slow-down again and lower its pressure. But the governor will automatically keep the volume of air supplied by the compressor absolutely constant. The governor has been patented by the General Electric Company; and it can be readily applied to their centrifugal compressors.

FLOUR-MILL DUST EXPLOSIONS.

In connection with the disastrous fatality in Glasgow reported in the "JOURNAL" last week (p. 480), by which a flour-mill was wrecked by an explosion erroneously attributed to an escape of gas, we are reminded by Mr. Watson Smith, the Editor of the "Journal of the Society of Chemical Industry," that six years ago, in a paper read by him before the Liverpool Section of the Society, he called attention to the explosibility of flour dust. He has forwarded a reprint from the "Journal" of the paper, the following extracts from which may be of interest.

Having referred to various substances which cause explosions, Mr. Watson Smith says: It only needs the use or occurrence on a sufficiently large scale of any of these or similar substances, dry and in a fine state of division, to give rise, under suitable conditions, to dangerous explosions. The truth of this remark is borne out in the case of flour dust, which, in the flour-mills of this and other countries, has caused very many disastrous explosions. There were two reasons why these disasters were not earlier understood. The first was that their cause was obscure. The bare idea that flour might explode appeared absurd on the face of it. The second reason was that, until the larger flour-mills of more modern times were erected, the explosions and fatalities were not sufficiently great, the ruin of life and property not on a sufficiently large scale, to attract special public attention. But just prior to 1872, in Frideat (Germany) and Buda-Pesth (Hungary), where flour-mills are specially numerous, so many serious fires and explosions occurred, that the attention of a few scientists had been drawn to the subject. But little was done, and no authoritative or weighty publication made.

On July 9, 1872, a violent explosion took place at the Tradeston Flour-Mills, near Glasgow, followed by a destructive fire. Eighteen persons were killed and sixteen injured. The damage to property amounted to some £70,000. A full report appeared in the "Glasgow Herald" of July 10, 1872. The "Herald" stated that at first it was supposed that the boilers had exploded. But subsequent investigation showed that some part of the machinery had gone; and the report adds, "probably the millstones, which were of great power, and liable to explosion through excessive friction." This explosion, it is added, was characterized by the fire following being of excessive ferocity; the flames shooting up 100 feet high at times. The adjoining property was much injured. A surviving workman said "he had carried a lamp;" so it is clear that open lights might at that time be used without any idea of danger—showing the ignorance then of any risk from the firing of a mixture of flour and air. The correspondence column of the "Glasgow Herald" also contributed additional proof of this ignorance.

After seeing the announcement of the Tradeston explosion, and having just then read an anonymous article in "Dingler's Polyt. Journal," I made an experiment, and found that dry flour and air would fire like a mixture of lycopodium and air, and communicated my conclusions to the "Herald" [issue of July 12]; thus giving the true cause of flour-mill explosions for the first time in English-speaking countries. The Royal Society of Edinburgh recognized my priority in framing the letter referred to; and it was established by Sir F. A. Abel, F.R.S., in his lecture at the Royal Institution in 1882.

Immediately following my letter, the whole subject was investigated by Rankin and Macadam. The origin of the explosion was conclusively traced to the striking of fire by a pair of millstones through the stopping of the feed, and the consequent friction of their bare surfaces against each other. The flame thus produced was quickly communicated to the mixture of dust and air filling the conduits connected with the exhaust-box; this being the common receptacle into which the mixture of dust and air is drawn by an exhaust fan through the conduit communicating with the several mills. From the exhaust-box, where a portion of the suspended flour dust was deposited, the air, still laden with dust, passed in the Tradeston mills, as in other flour-mills, to another room, called the stive room, where a further quantity of the flour would deposit. Hence, as Sir Frederick Abel clearly showed in his lecture at the Royal Institution in 1882, on "Some of the Dangerous Properties of Dusts," there were here a connected series of channels and larger enclosed spaces filled with a dust-laden atmosphere, through which flame was so rapidly transmitted from the millstones, where the first ignition occurred, that violent explosive effects were produced, succeeding each other with great rapidity in different parts of the building. The production of the blaze at the millstones was observed to be at once succeeded by a crackling noise as the flame quickly spread through the conduits to the exhaust-box upon an upper floor, whence a loud report almost at once proceeded.

Rankin and Macadam's inquiries elicited the fact that other flour-mill explosions had been attended by a similar succession of effects to those just indicated. Sir Frederick Abel then points out that Rankin and Macadam ascertained that accidents of this nature at flour-mills were of frequent occurrence, especially since the exhaust arrangements had been applied to the larger flour-mills. And in their report it is added, that "it seems scarcely possible to guard against such accidents, though their frequency may be reduced by adopting efficient precautions for avoiding the stoppage of the feed to the millstones and the access of nails or other iron particles to the stones; also by prohibiting the employment of naked lights in the vicinity of the mills or dust passages."

Various other suggestions are given of a similar character. But Sir Frederick then makes this important statement: "Since the publication of Messrs. Rankin and Macadam's valuable report, the accidents at flour-mills appear to have been scarcely less numerous or disastrous than before the date of the Tradeston catastrophe." He gives a series of illustrations of this fact, both in America and in this country. Among these, a great explosion occurred in 1878, at Minneapolis, Minnesota, where eighteen lives were lost and six corn-mills destroyed. The cause of the explosion was then traced by Professor Lawrence Smith to the same cause as that already given.

In 1881, the statement of Rankin and Macadam, that "it seems scarcely possible to guard against any such accidents," &c., seems still to be verified; for in September, 1881, a fatal flour-mill explosion occurred at Macclesfield, and a report thereon was made to the Home Secretary by Mr. T. J. Richards, of the Board of Trade. The cause here was traced to (1) the use of a very dry grain, and (2) the accidental stoppage of the feed. The year after the Macclesfield explosion [February, 1882], an explosion occurred at Rochdale, in the exhaust-room, through the stones striking fire. A fire followed, doing damage to the extent of £33,043.

Rankin and Macadam, and Professor Lawrence Smith and T. J. Richards, only go so far as to show how disaster is liable to haunt any arrangement of flour-mill plant known up to 1882, and even later; and Sir Frederick Abel, in his lecture before the Royal Institution, goes no further than this. Even at this day [1905], there still exist flour-mills conducted on the old type, and overshadowed by the same risks as in, and prior to, the year 1882. In the case of these, the old statement of Rankin and Macadam, that "it seems scarcely possible to guard entirely against such accidents," is as true as ever.

Mr. Watson Smith then described the Simon "Cyclone" system of collecting flour dust, which enables flour to be milled with perfect immunity from danger.

Murdoch Relics for Birmingham.—At the first business meeting of the Greater Birmingham City Council last Wednesday, the Lord Mayor (Mr. W. H. Bowater) read a letter from Mr. George Tangye, of Heathfield Hall, announcing an important gift to the city. Mr. Tangye said: "Some time ago I purchased the unique collection of Boulton, Watt, and Murdoch relics in the Museum of the Soho Foundry, and they have been carefully preserved in a room at the Cornwall Works, and have been seen by a large number of visitors from all parts of the world. I now have the pleasure to offer them to the Corporation." The collection includes models of Watt's engine indicator, Murdoch's rotary engine and pump, a section of the Newcomen engine, and numerous letter-books containing copies of correspondence of Boulton and Watt. As there will be some expense in housing the collection in a suitable room where they can be easily seen, Mr. Tangye said he should be pleased to contribute £250 towards the cost. The Lord Mayor mentioned that about sixteen years ago the then Free Libraries Committee inspected these relics and other objects, and endeavoured to purchase them at a public sale. Mr. Tangye, however, outbid the Committee. That he should now have given them to the city was another evidence of public spirit. He proposed a resolution thanking Mr. Tangye for his offer.

CONDENSATION:

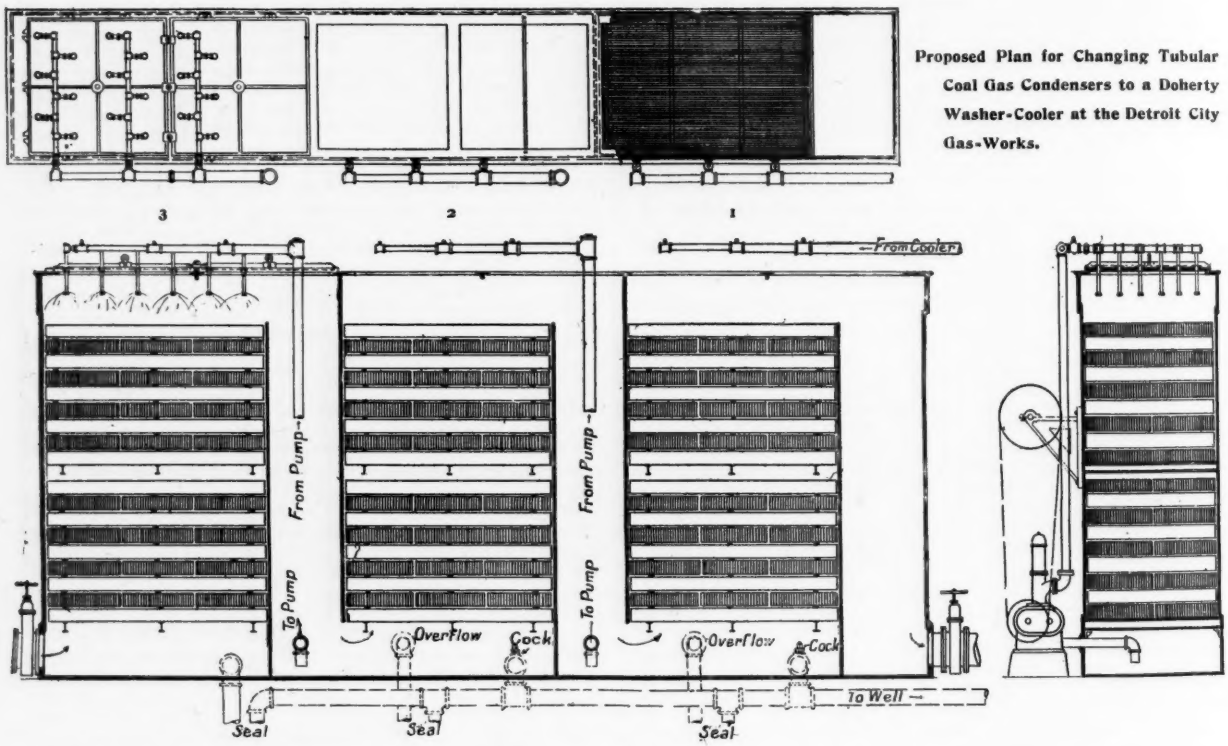
WITH SPECIAL REFERENCE TO WATER GAS.

At the recent annual meeting of the American Gas Institute, Mr. L. E. WORTHING read a paper entitled "Some Principles of Condensation, with Special Reference to Water Gas." The following are some extracts from the communication.

The author began by remarking that any attempt to gather from the technical publications data with reference to condensation impresses one at once with the extreme paucity of information concerning water-gas condensation, and the comparative abundance of literature on the condensation of coal gas. One cannot fail to be equally impressed with the widely conflicting theories of condensation there set forth, even where the practice is substantially the same. Although, generally speaking, the advocates of slow condensation have had the upper hand in recent years, yet we are left in doubt as to whether it is most desirable to effect a uniform slow condensation, or a condensation rapid in some parts and slow in others. Shall we carry the tar-fog some distance along the condensing system, thereby bringing it to an equilibrium of tension with the naphthalene in the gas, and sacrificing the candle power, or shall we remove it at once mechanically by a Pelouze and Audouin apparatus, or by one of Dr. Colman's cyclone separators? Shall we expose our gas in the hydraulic main to the solvent action of the tar, or shall we spray our gas with tar at the outlet of the hydraulic main? Shall we go still further—with Professor White, of the University of Michigan, who has given us the results of a series of experiments in the course of which gas was actually washed with tar of various consistencies and at different temperatures [see *ante*, p. 117]—or shall we abandon slow condensation altogether, with M. Sainte-Claire Deville, who has given up the attempt to retain the benzol which will dissolve in the tar if the latter is allowed to come to an equilibrium of tension with regard to the benzol in the gas, in order to rid himself of the naphthalene which will also be dissolved in the tar under these circumstances? *

All these systems of coal-gas condensation are conditioned by the necessity for the removal of naphthalene. Water-gas condensation, however, faces no such limitations. Putting aside the naphthalene question, the object of condensation is to retain in the gas the desirable while ridding it of the undesirable elements. We desire to retain a maximum candle power and heating value—in other words, the greatest possible quantity of benzol and other light oil vapours—at the same time freeing it from tar-fog and heavy oils. The process of condensation is governed by the laws of vapour tension—the laws of Dalton and Regnault.

Water-gas leaves the superheater at a temperature of from 1250° to 1450° Fahr. As it is cooled, the components of lowest vapour tension will condense out, leaving the gas more or less saturated with the components (benzol, &c.) of higher vapour tension. But these high-tension vapours, or liquids, are miscible in all proportions with the liquids (tars and heavy oils) already condensed having low vapour tensions.



Proposed Plan for Changing Tubular Coal Gas Condensers to a Doherty Washer-Cooler at the Detroit City Gas-Works.

Regnault's law that, when two liquids are miscible in all proportions, the vapour tension of the mixed liquid is intermediate between the tensions of the separate liquids, then comes into operation. If the operation of this law is allowed to continue till the system—gas, benzol, &c., and condensate—is in equilibrium, the effect will be that some of the high-tension vapours (benzol, &c.) will be absorbed by the liquids of low vapour tensions (condensate), and the average vapour tensions of the gas and condensate with respect to benzol will be the same. Consequently, the illuminating power of the gas will be appreciably diminished. If the system comes to partial equilibrium, the condensate, or liquids of low vapour tension, will absorb some of the benzol, &c., having high vapour tensions. The amount absorbed, and hence the decrease in candle power, will depend altogether on the degree of equilibrium which the system has attained. This degree of equilibrim depends on three factors: (1) Time of contact of the condensate and the gas; (2) state of division of the condensate; (3) temperature of the gas and the condensate.

Over the second of these factors, we have little control. Concerning the first, it is obvious that the longer the time of contact between the gas and the condensate, the greater the opportunity for them to come into equilibrium of tension with respect to benzol. Concerning the third, it is equally obvious that the lower the temperature which the system is allowed to attain, the higher will be the percentage of benzol absorbed by the condensate from the gas. In other words, in order to rid ourselves of the tar and heavy oils, we are taking from the gas some of those valuable constituents which we wished to retain.

It is necessary to cool the gas in the condensing system to the lowest temperature it will meet in the mains; otherwise we are simply increasing the length of our condensing line, and shall get condensate out of the drips. When the gas is cooled to this necessary temperature, the condensate contained in it is in the best possible condition to absorb benzol, because it is in a state of extremely fine division, offers a large absorbing surface, and can thus come rapidly to a condition of equilibrium with the gas. This tar-fog is only slowly removed from the gas by friction along the sides of the mains, in the relief holder, in the tubular condensers, and finally by the Pelouze and Audouin apparatus.

Obviously, then, by any system which admits of a state of equilibrium of tension between the gas and condensate, we are losing a part of the valuable high-tension vapours; and it is equally obvious that any form of slow condensation presents a very favourable condition for such an equilibrium, both on account of the comparatively long time-contact between the gas and the condensate, and the extremely fine state of division of the condensate in the form of tar-fog. A logical system of condensation would be one that afforded as short a time-contact as possible between the gas and the condensate, or rather the complete removal of that condensate as soon as formed. A system which satisfies to a great extent the conditions imposed by a consideration of the laws of vapour tension is that offered by the Doherty washer-cooler. Briefly, this is a device in which an ascending current of gas, travelling at a relatively low velocity, meets a descending current of water sprayed into the chamber by any suitable means.

* See the translation of the paper read by M. Laurain before the Société Technique du Gaz en France, given in the "JOURNAL" for May 30 last (p. 602).

The water spray serves at once to reduce the temperature of the gas in the most efficient manner, and to wash out and carry away mechanically the resulting products of condensation. By this means, the condensate produced by a given lowering of temperature is carried away before it has had time to come into equilibrium of tension with the gas.

The washer-cooler about to be described was installed at one of the works of the Detroit City Gas Company in August, 1910. An old condenser shell, formerly used for coal gas, was utilized for the apparatus, which is shown in the accompanying illustration. It was 33 feet long, 14 ft. 10 in. high, and 5 ft. 2 in. deep. It was divided into three washing compartments by suitable baffle-plates, so arranged that the gas passed always up against a descending water spray. These compartments have been numbered 1, 2, and 3; the first compartment being next to the outlet gas, and the numbering having reference to the circulation of the water instead of that of the gas. Each compartment was filled with twenty courses of wooden grids composed of ½-inch by 6-inch strips, set edgewise, separated by ¾-inch spaces. The strips in each course of grids were set at right angles to those in the courses above and below, so as to provide the most effective washing arrangement.

The liquor circulation, beginning at the well, was as follows: Suction line from the well to No. 1 pump, which forced the liquor through a cooler, consisting of two stacks of twenty 2½-inch pipes connected by cast-iron return bends, each stack being made up of 20-feet lengths. The cooling water was supplied by the works pump, and was distributed over the pipes by wooden troughs carefully levelled so that a stream of water of uniform thickness overflowed from one side of each trough. The liquor passed from the cooling-coil into the sprays of the first section, and then down the grids to the base; from there through a suction line to No. 2 pump, which forced it into the sprays of the second section; thence to No. 3 pump and third section; and from there it overflowed through an 8-inch sealed overflow into a 10-inch line to the well. This served as a liquor reservoir and separator basin for the tar, which was pumped daily into a small well alongside, from which it flowed by gravity to storage. The pumps, which were of the Roots rotary type, were geared to a 5 H.P. three-phase motor; and actual working tests showed each pump to deliver 125 gallons per minute. They were so connected that Nos. 1 and 2 or Nos. 2 and 3 were interchangeable. One, two, or three pumps and one, two, or three sections of the washer-cooler could be used at will.

The apparatus has been in operation for more than a year, and has given most satisfactory results. It has dealt with a make of more than 300,000 cubic feet of gas per hour without difficulty, so long as we could obtain sufficiently cold water for the cooling coils. The water required is only one-thirteenth of that necessary for the old form of tubular condenser—thus relieving the works pump of a very considerable load. The ground space, assuming it to replace scrubbers for four machines, is only one-fourth of that necessary for the scrubbers. The tar and heavy oils are totally removed at considerably higher temperatures than in the ordinary operation. This results in more effective purification, ease of revivification, and longer life of material. The percentage of oil and tar present in the purifying material is less than one-sixth of the percentage present under the old method of operation. The material comes out of the boxes loose, instead of in sticky cakes, and revivifies with most remarkable rapidity and thoroughness. That this system of condensation does not produce a "tender" gas, has been thoroughly demonstrated by actual operation records since it was installed, under very severe weather conditions. Water gas of rather high candle power was pumped into an enclosed holder. After standing for 24 hours, it was sent through a main for a distance of more than three miles to an open holder, and allowed to remain for 72 hours, after which it was pumped back. The gas in the holders was subjected to a minimum temperature of 12° Fahr., and an average temperature of 26° Fahr. The average loss in illuminating power was 1·15 candles, and in calorific power 9·2 B.Th.U. As the result of some tests, it was found that the tar separated in the washer-cooler was 363 grammes per 1000 cubic feet of gas. The proportion of benzol in the tar was 1·3 per cent.; and the quantity lost in the apparatus was only 0·005 gramme per cubic foot of gas.

The author does not wish to be considered as holding a brief for the washer-cooler. It can only be regarded as one method by which the principles laid down at the beginning of the paper can be successfully applied to water-gas condensation. The basic ideas that a consideration of the laws of vapour tension force upon us are: (1) That slow condensation, in which tar-fog formed is carried along with the gas at a diminishing temperature, is ruinous to candle power, owing to the tendency of the tar-fog to come rapidly into equilibrium with the gas at these reduced temperatures, when its specific capacity for absorbing benzol is much greater than at the temperature at which it was formed. (2) That, disregarding the naphthalene question, as we can generally afford to do in water-gas practice, a successful system of condensation must be one which will remove the tar fog or condensate, at comparatively high temperatures, as soon as formed, so that it will not have an opportunity of getting into equilibrium with the gas, with respect to benzol, at the final temperature at which the gas must enter the mains.

There is no reason why this system cannot be applied to coal-gas manufacture, always providing that the outlet temperature of the gas from the condensers is at least as low as any temperature it will afterwards encounter. If, after we have removed the tar at a comparatively high temperature, the gas is further washed and cooled, the effect will be that only a small amount of comparatively heavy oils will be removed, together with the naphthalene in excess of that necessary to saturate the gas at the outlet temperature. Illuminating power will not be affected, because there is not enough benzol in the gas to saturate it, even at the minimum temperature; and the amount of condensate extracted after the removal of the tar is so small in volume that it will have practically no effect in absorbing benzol according to the tension-equilibrium laws. There will be just the amount of naphthalene in the gas necessary to saturate it at the outlet temperature of the gas. If the gas is not further cooled, there will be no deposition of naphthalene in the mains. Of course, if we wish to remove the naphthalene from the gas, so as to let it enter the mains in a really unsaturated condition, we must adopt the method by which the gas and the condensate can come into equilibrium of tension at low temperature, which means the absorption of a large amount of benzol; or we must take the tar out first, and further cool it to a temperature considerably below that which it will afterwards encounter. Of these two systems, the latter will be by far the most desirable with respect to candle power.

The advantages of the washer-cooler system may be summed up as follows: (1) Complete removal of the tar fog at comparatively high temperatures as soon as formed. (2) Fractional condensation, or rather a fractional distillation of the condensate, on its way from the top to the bottom of the washing compartment. (3) Great capacity, the limit of which is yet to be determined. (4) Small ground space occupied. (5) Low initial cost. (6) A very considerable decrease in differential pressure through the condensing system. (7) Ability to deliver gas to boxes at higher temperatures, causing more effective purification. (8) Purifying material in good condition when removed from the boxes, which enables a manager to revivify it more rapidly, and use it up to a higher percentage of sulphur. (9) Better oil results, because this system of condensation prevents the absorption of an excessive amount of benzol by the condensate, and hence gives increased illuminating power.

For these reasons, though the washer-cooler may not be the last word in condensation, it offers such unique and exceptional advantages over the system of slow condensation, that in the author's opinion it must come more and more generally into use in modern water-gas practice.

The Recent Action against the "Journal."

The "Hardware Trade Journal" alludes to this matter, saying: We tender our sincere congratulations to the "JOURNAL OF GAS LIGHTING," upon the result of an action brought against them for libel. The "JOURNAL," like so many other publishers, has been put to a good deal of expense and inconvenience by a frivolous demand for damages for libel. This case may properly be described as frivolous, as the plaintiff did not think it worth his while even to appear when called upon. It provides another admirable illustration of the grievances under which newspaper proprietors labour, and should tend to strengthen those who have in hand the Bill which is now before Parliament, and the object of which is to discourage these frivolous libel actions. Our contemporary has been put to considerable expense in this case; the lawyers have spent twelve months in preparing evidence to justify the article which they thought wise to publish in the interests of the trade; counsel have been briefed; and the bill, one way and another, must be a pretty heavy one. All this trouble and expense has been incurred simply because a man named Louis Dosteel thought fit to issue a writ for libel. Our contention is (and we do not doubt it is a just one) that the "JOURNAL of GAS LIGHTING" should have been in a position to demand, upon the issue of the writ, security for costs. It is a great hardship upon publishers that they should be at the mercy of any man of straw who cares to issue a writ against them. The law, as it at present stands, is a distinct deterrent to the exposure of fraud; and means ought to be found of amending it without further delay.

We have received from the Principal of the Municipal School of Technology, Manchester (Mr. J. H. Reynolds, M.Sc.), the "Journal" of the school, containing a record of investigations undertaken by members of the teaching staff and students during the past year. The contents of the book do not include subjects of special interest to our readers, with possibly the single exception of an abstract of a thesis, written by Mr. E. Shaw for the degree of M.Sc. Tech., on "An Experimental Investigation into the Strength of Lead Pipes." The author found that, on the results of the bursting tests being tabulated and plotted in parallel with theoretical results obtained in consideration of the ordinary thick and thin cylinder formulæ, a new formula was constituted which lay between the two. An investigation was made of the strength of lead pipe in relation to the chemical composition of the material and the effect of foreign ingredients. It was found that antimony in the lead strengthens it. The presence of copper, however, has little effect on the strength of the pipe; but it facilitates the solvency of the lead in any hot acid passing through it. This danger is not likely to occur in the ordinary use of lead pipes for water supply. The "Journal," which is the fourth volume of the series, is an excellent record of work.

AMERICAN COMMERCIAL GAS ASSOCIATION.

Some More of the Papers Submitted.

In last week's issue, there appeared abstracts of the Presidential Address and some of the papers submitted at the recent Seventh Annual Convention of the National Commercial Gas Association of America, which took place at Denver. The remainder of the communications are noticed to-day.

SOME NOTIONS OF A MANUFACTURER.

By Robert K. Clark, of Chicago.

The manufacturer of appliances and the gas company are together in furthering the use of gas-consuming apparatus. But in regard to the details of construction of the regular cooking appliances, the buyer and the manufacturer are not always agreed. What shall be the proper construction of these appliances, and what shall be their cost, is where opinions diverge.

The manufacturer aims to make as efficient, as serviceable, and as saleable a piece of goods as he can for the price that the market warrants. Ingenuity and experiments, coupled with experience and contact with gas companies all over the country, have brought out new ideas in design and construction; and each manufacturer has developed what, from the evidence, seemed best to fill the demand. The purchaser of appliances has first selected from what has been offered, then has requested special features, and the final development has been the drawing up of a set of specifications. The manufacturer has had to meet much of the demand for special features; and this has combined to produce new construction. Requirements have, however, been so divergent that the number of ways a stove can be built is almost beyond belief. The proof which appeals to me that many of the requirements are captious or inadvisable, lies in the fact that the opinions of different companies operating under practically similar conditions, and each spending large sums of good money comparing and testing stoves and water-heaters, are diametrically opposed. The drawing-up of specifications has been the natural outcome of experience with stoves of poor manufacture, since specifications simplify the work of the buyer by eliminating at once certain makes. The making of these specifications is interesting, and frequently advisable, but I believe only in a general way. No company has attempted to go as far as I have heard advocated—that is, to the point where one repair would fit all the makes handled. Though ideal, this would be manifestly impossible, as it is difficult enough for each manufacturer to keep his own parts so that they are interchangeable for similar stoves of his own manufacture. Besides, it would do away with all variation in design for many parts of the stove.

The trouble with specifications that go into minutiæ is that they tend to reduce the initiative of the manufacturer. Without detailed restrictions, he is able to use his ingenuity to develop ideas in construction and material that can only be tested out in use. Many things can be done in more than one way, and be done equally well. Why, then, in the stove business should one method of accomplishing a result be seized upon as the only admissible solution, when another at hand has equal merits, or one still better might be developed?

I believe minute specifications a mistake from both sides, especially when uniformity among buyers does not exist. Under a rigid specification ruling, stoves of superior workmanship and appearance may be refused by one company on details that coincide directly with the specifications and requirements of another careful company. From the manufacturer's standpoint the matter presents a great deal of difficulty. He may be supplying a large number of stoves which are giving satisfaction, but is barred from selling to certain companies on account of unimportant structural details. If these details involve radical changes, it means a new line of stoves, if he is to get this particular business. Should he decide to make the special appliance, he does so at his peril; for the price must be low, no volume of business is assured, and the stove may not be something desired by other companies. This may be easily considered the manufacturer's gamble; but it certainly is a hardship. It probably is unnecessary for me to say that the buyer can impose whatever conditions he likes; but I maintain that it is to the interest of both that detailed requirements should not be demanded.

THE MODERN GAS-FIXTURE.

By Chas. E. Ummach, of Chicago.

Modern gas-fixtures should be constructed so as to give the best results from a practical lighting standpoint, without destroying its decorative effects. Careful study of construction is very necessary. The proper placing of shut-off keys is extremely vital, so as to overcome as much as possible the conduction of heat, and so avoid the contraction and expansion of metal, as well as drying out the key grease used as a lubricant. As yet no one has been able to actually overcome the objectionable features of damaged finish, caused mostly by the use of an inverted incandescent gas-burner. The action of intense heat on the lacquer, coupled with carbon deposits caused by improperly adjusted burners, and sometimes on account of the variance of gas pressure, has a tendency to turn the metal parts that come directly in contact with the action into a grey black or burned brass finish, making the contrast with the balance of the fixture rather unsightly. This, however, can be overcome to a certain degree by having the finish of the fixture in old brass or antique brass.

The design of a modern gas-fixture is a matter of decoration. The old type of chandelier was patterned after the various periods of design; and the method is still in vogue. Changes in construction in both gas and electric fixtures have been most notable of late years; and nearly all have proved practicable. A vast number of lighting effects have been made possible by the use of electricity as an illuminant; and similar effects are now procured by the use of the inverted gas-burner, as well as a similar type of upright incandescent gas-burner arranged with glassware and holders of such sizes as to permit the use of the regulation size electric shades. It may seem strange that it is necessary to imitate electric lighting effects; but it falls to our lot to keep pace with the times. The electric fixture is nothing more than a direct imitation of the gas-fixture; and from time to time improvements were made that not only added beauty to the design, but resulted in a more practical method of illumination.

About ten years ago, an attempt was made to introduce the illuminating engineer; and to-day the illuminating engineer has a profession and plenty of work for him to do. As time goes on, we learn of our shortcomings and the actual conditions that must be met, which again will result in changes of construction, as well as in design. Modern gas-fixtures will undergo more changes than modern electric fixtures, owing to the construction of a gas-fixture, as it is more exacting, and the possibilities of the appearance of the old bogey (leak) must be reduced to a minimum.

We are confronted with a new problem—the indirect method of lighting (a very good way indeed); it requiring a greater amount of energy to gain the proper results. A great many indirect lighting installations are in use, and no doubt satisfactory—in fact, in some instances, they are the ideal way of lighting a room. Very few indirect gas installations have thus far been made; but the possibilities are just as great and encouraging for gas as for electricity, particularly with the use of an upright incandescent gas-burner. There is an open field, an ever-broadening outlook for gas lighting; and, quite aside from possibly a few overcrowded centres, gas will always be one of the chief sources of illumination. Wealth is increasing, culture becoming broader, and the knowledge of the best and desire for the best in the home is growing more acute. An energy equal in quantity andquality to that squandered on the propaganda of gas for fuel will go far to wrest the banner of lighting supremacy from the electric fixture; and actual co-operation between gas companies and fixture manufacturers is positively needed. Mere cheapness must be forgotten. Tell your consumer something of good light, its possibilities both as a decorative element and as a dollar-for-dollar investment, and its greater efficiency. The result will do much to encourage the gas company, as well as the fixture manufacturer.

PENSIONS AND PROFIT-SHARING.

By J. B. Douglas, of Philadelphia.

Though public service corporations as a rule have not formally adopted systematic pension or profit-sharing plans, they nevertheless have been actually paying pensions and granting benefits for years past. With respect to pensions, their course has been to take up each worthy case individually, and to make an allowance according to circumstances. While employers have oftentimes paid more per case than they would have under the average pension or service annuity scheme, the number of pensions granted, and the feeling of security on the part of employees, has been less than it would have been under a regular plan. As the natural course of events in the business world of recent years has been in the direction of large consolidations, with a resultant lessening of individual enterprise, it is becoming more and more apparent that some means must be devised to stimulate the interest of the employee, to the mutual advantage of both himself and his employer.

In endeavouring to solve this problem, employers are constantly giving fresh evidences of willingness to assist their faithful and efficient employees, and of a desire to create in them an ever-increasing interest in the welfare of their company. Encouragement is being given employees along this line through the granting of pensions, the payment of bonuses for extra effort, and by affording them opportunity to purchase the stock of their company at attractive figures. In one instance within my knowledge, a corporation offers to purchase its stock on the open market for its employees, and to carry it at the low annual rate of interest of 3 per cent., while it is paid for in instalments. This is but one of a number of instances proving the progress of the co-operative spirit. The attention now being given to broad plans designed to insure co-operation between employer and employee is fast bringing corporations to the crest of a wave which will carry with it more than the present general interest in the subjects of pensions, or compensatory retiring allowances, and profit-sharing; and the result will be that ere long every representative corporation will offer even greater advantages to its employees—at least to those who have been faithful, and whose services have been meritorious. In the near future we may see insurance companies offering employers attractive rates on policies covering voluntary pension, retiring allowance, or service annuity plans, as they are interchangeably termed.

The Consolidated Gas Company of New York now have what they term a superannuation list, to which deserving employees are retired at the discretion of the Company. The usual course is to

allow 1 per cent. for each year of service, based on the average pay for the five years preceding retirement.

Gas companies in general have not adopted systematic pension, retiring allowance, or service annuity plans to the same extent that has been the case in other manufacturing concerns and railroads; but I believe that if the gas companies of the United States are going to maintain well-balanced progress, the time has arrived for them to make definite pension provision for those of their employees who are entitled to it. In addition, they should take up general welfare work. Consider the splendid progress made by the several component departments of the average gas company of to-day! Does it not seem that definite provision should be made for those responsible for this progress, through pensions, retiring allowances, or service annuities? Some are of opinion that pensions are but a deferred form of profit-sharing; and that, this being the case, where but one of the two is possible, direct profit-sharing is preferable. To my mind, however, of the two, a good pension or service annuity plan is the more desirable, as it best conserves the interests of the great mass of wage-earners who are neither thrifty nor saving.

The method of rewarding deserving employees in force with the Boston Consolidated Gas Company is both unique and attractive to the employees. The Company regard it as better than the ordinary pension system, in view of the fact that the employee has "constantly before him the welfare of the Company, which is so closely connected with his own receipts in the form of shares and dividends." The plan of the Company is to offer to the most efficient employees, over and above their regular compensation, an annual share in the profits of the Company, called a premium, and calculated on annual salaries or earnings at the same rate as dividends on the stock, to be applied towards the purchase of stock of the Massachusetts gas companies. As the rate at which dividends may be declared or increased depends upon economy in furnishing gas, the employee has a great incentive to work as efficiently as possible.

Persons who have been in the employ for a year or more are eligible, provided their work has been such as to warrant participation; opinion as to the latter being based upon advices of the immediate superiors of the employees. The plan is designed to include all employees who are temperate, energetic, honest, capable, and efficient, or those who have displayed the greatest regularity, intelligence, and energy in the Company's business. In calculating premiums, no deductions are made on account of sickness of less than two months. If of longer duration, corresponding deduction is made. Premiums are declared twice yearly. A separate account is kept by the Company for each employee; and the amount of premium declared is placed to his credit. When the sum is sufficient to purchase one or more shares at the market price, the Company will pay the employee in cash or buy the stock for his account. Undisposed-of premiums remain to the credit of the employee, and they draw 4 per cent. per annum. Employees may sell their stock at any time. At the last report, 700 out of about 900 of the Company's employees were profit-sharers.

The profit-sharing plan of the Boston Consolidated Gas Company is an admirable one. It is a singular fact that, of the number of prominent gas companies I have addressed on the subject, the Boston Company is the only one operating a profit-sharing scheme; and with them it has passed well beyond the experimental stage. I am informed that the results are quite gratifying; and I believe that other gas companies, in the interest of real co-operative effort, can well afford to adopt similar plans, providing returns of equal or greater value to their employees.

INCREASED EFFICIENCY IN SCIENTIFIC OFFICE ACCOUNTING.

By Paul R. Jones, of New York.

The writer is of the opinion that the various departments of a corporation are so closely allied to the accounting department that an increase of efficiency in that department will in some measure be reflected in each of the other departments. Therefore his remarks will be confined to matters which would seem to most deeply concern the office manager—*i.e.*, the efficiency of the office employees, and economy and accuracy in accounting methods.

The management can well afford to spend much time and money on the instruction and training of employees, and, after carefully noting the characteristics of each individual, assign him to the work for which he is best fitted. If this were done, in but a short time the force would be in a high state of efficiency; and a considerable net saving in labour costs would result to the company. The benefit would not accrue alone to the company, but would also accrue to the individual, since the management can then well afford to pay a higher scale of wages than would be possible where inefficient men are employed—and this because a saving in the number of employees would be effected if each employee were selected and assigned to work for which he shows the greatest natural inclination, and for which he has been trained. The poorest form of economy is the employment of cheap and inefficient labour.

The aptitude of an employee must be considered, and his energies directed. A good man is often spoiled and set down as a failure due to lack of intelligent instruction, notwithstanding his willingness to learn the work assigned to him.

If the work of an office were analyzed, and the system of scientific direction of the men employed were followed, the saving to a corporation, and consequent increased benefits to the employees, would be most surprising to those who gave due thought to all the problems involved. But one cannot hope for material betterment unless a detailed investigation of all conditions is made. A superficial canvass of the situation will not do; nor can improvements be made in a day. It is necessary to study the relation of the accounting department to all other departments; and it is as essential to instruct a man on the service gang so far as his work may relate to accounting, as it is to instruct the accountant. An office force may be efficient, and yet seem to appear inefficient, due to the fact that the allied departments are left more or less to their own judgment as to their relation to the accounting department. The lost time and added expense in most all companies, due to lack of understanding as to just what is to be done, is enormous. Friction between men or departments should not be tolerated; and the employee should be brought to feel that his interests are identical with those of the management, and that his advancement depends solely upon his contribution to final results.

Every corporation should maintain as elaborate a system of accounting as is consistent; the ultimate object being to present as complete and detailed an analysis as possible of all vital conditions relating to the company. Unless a system permits of presenting absolute facts, it is impossible to determine wherein operating charges may be decreased, and one cannot intelligently make an investigation with a view to improvements. Corporations often find themselves in difficulties, due to lax and faulty records and consequent inaccurate statement of conditions. In many companies the amount of lost motion and useless work done each day in the accounting office is great and primarily due to the fact that additions to, or subtractions from, a system have been made without due thought as to wherein the new method may conflict with the old. Accounting work should be so systematized that the greatest amount may be done in the least possible time; and this is what all managers should strive for.

Increased new business sometimes seemingly handicaps a force, and immediately additional clerks are hired to relieve the congestion, when perhaps the system in use is responsible for the fact that the work cannot be handled by the present force. If an emyloyee is to work at the highest point of efficiency, he must be given satisfactory tools with which to work. An accounting system may become cumbersome through the addition of various forms and records, which, on investigation, might be simplified without impairment, by elimination or by combination of records. Gas companies generally have their own peculiar accounting conditions to meet; and systems installed, to be of value, should fill such requirements. The writer is a firm believer in a standard uniform system of accounting, that possesses sufficient elasticity to be either enlarged or condensed as conditions warrant. Essential qualifications for economy in an office are accuracy, speed, and the elimination of features which retard the employee. In this connection, the value of modern time-saving devices for increasing efficiency should be considered by the management.

UP-TO-DATE ADVERTISING METHODS.

By Thomas R. Elcock, Junr., of Philadelphia.

It is not necessary to employ argument to show that advertising pays in the gas business. Whenever advertising has been done, results have been noted which abundantly prove its value. Where return post-cards and folders bearing return messages have been carefully sent to live prospects, the percentage of answers and the sales that follow them, have more than warranted the expenditure, and the sales influenced by them could never be definitely calculated. Furthermore, following the appearance of a striking newspaper advertisement, a jump in sales and the increase of visitors at the gas appliance display room have almost invariably been observed. As to our advantage over other lines of business in the way of direct advertising, it need only be pointed out that advertisers as a rule must count upon a tremendous amount of waste, because but a small percentage of persons addressed by them are really in the market for their goods. But with us it is different. We know so well who are our patrons, in what they are interested, and in what manner they may best be reached, that very little is left to chance. Our remarkable advantages in this respect make of our direct advertising perhaps the surest means known to the profession of publicity for creating sales.

By direct advertising, I mean advertising which goes direct to the consumer, either through the mails or else by messenger. We have a unique advantage in that, by means of meter and service applications and the visits of our representatives to homes and business places, we are able to keep a complete and accurate running file of prospect cards, on which are indicated those appliances which any given consumer does not, but should, possess. This means that we have only to go with our advertising matter and our representatives to the homes or places of business and work persistently for the potential orders which we know to be there. The element of uncertainty is minimized; it is mainly a question of how well we perform our part.

The method of distributing advertising matter, following it up, and checking results, is a recent development. In the case of the newspaper advertisement, definite and accurate checking is impossible; but in direct advertising a certain system can be maintained. I do not mean to intimate by this that newspaper advertising is not valuable to our industry. Newspaper advertising is a study in itself, and has great possibilities if well done. In this,

I consider the most valuable type to be the consecutive talk—a short, newsy diary of interesting facts appearing in the daily paper each day, or not more infrequently than every other day,

In considering direct advertising, it is important to have a careful system, whereby the selling leads may be properly followed up and the orders properly taken care of. The circular letters, folders, return post-cards, and the like, must be carefully placed in the hands of the right prospects, in the right way, and at the right time; and even then there will be few chances of making sales unless the selling force works in unison with the advertising pieces, and carefully develops the desire to purchase, which the printed matter has created. The salesman must be thoroughly acquainted with the character of the advertising; so that, when talking to consumers, he may dwell upon it intelligently. Even when this is done, it is often impossible to clinch an order on the one visit. Good advertising combined with good salesmanship should be cumulative; and our experience shows that fully three pieces of advertising matter, followed closely by visits from the salesmen, are often necessary in order to effect a sale. It is very common to learn of several folders advertising different gas appliances being sent out to all prospects at the same time, and the matter there permitted to drop, without any further follow-up effort on the part of the selling force. This is illogical, and absolutely unprofitable. Unless the organization of a company is such that direct advertising may be systematically followed up, it is unquestionably better not to attempt this form of advertising.

Advertising is so closely allied with salesmanship that the sales manager and advertising manager in any situation should be either one or closely related. Advertising is something entirely different from what it was once held to be. It does not consist in merely writing and placing copy, but in creating business in the broadest sense of the term.

PRACTICAL DEMONSTRATION.

By Mrs. Anna A. Carroll, of Philadelphia.

The attempt to create an increased use of gas by its introduction as a fuel for domestic purposes demanded that the public be taught by example. Teaching by example is demonstration. Practical demonstration means the analysis of the conditions in every home the demonstrator visits. Just what these conditions are, can be determined only by observations and deductions made by the visiting demonstrator. When a new range is installed, it is advisable to call about one week afterward, when proper instruction can be given by the demonstrator.

"Inspection" or "house-to-house work" is one of the most important branches of the work from the standpoint of practical demonstrating. When a range is new or even re-connected, the demonstrator is met with a certain amount of interest in the mind of the consumer; and she is likely to be more receptive to suggestions. But in the inspection work, the demonstrator is met with indifference, antagonism, and very often ignorance. The demonstrator must not only prove to them that cooking with gas is the best and easiest way, but she must arouse an ambition to want to do their cooking in the best and easiest way. Here is where the skill of the good demonstrator is proved. She must create an interest. Even where ranges are in use, skilful questioning brings out the fact that consumers have an idea that there are certain classes of work that cannot be done on a gas-range. This idea must be corrected. The demonstrator on inspection work, when she finds no gas appliances in the house, makes their acquisition so attractive to the consumer that, even if a sale is not already promised, interest is created in the use of gas appliances, and their many advantages commented upon.

The lectures and demonstration work in public halls have been largely abandoned for the demonstration work in the homes, as the claim is made that it had not been productive of results sufficient to pay the expense incurred. Where this has been the case, these lectures will, in many cases, be found to have been given by a lecturer who has devoted more of her time and energy to exploiting her skill as a cook than to the showing of the efficiency and economy of gas as a fuel. It is more important that the lecturer should be a qualified exponent of gas for fuel than an expert cook. One class of business that has been very difficult to secure is that of those who claim that they will not trust gas ranges in the hands of servants, owing to the cost of operating them. A series of lectures showing a variety of full meals cooked on the gas-range, with a meter operating in full view of the audience and the consumption given at each lecture, would do more to convince this class of people than all the arguments or printed matter generally used.

Ignorance of the principles of cooking is another large factor in keeping ovens out of use. This is where public demonstration pays. An important factor in the demonstrator's work is the education of the consumer to the increased consumption necessary to make the sale of all appliances profitable; and it is her business to show the consumer, not only how to do the maximum amount of work at minimum cost, but also to educate the consumer up to increased gas bills, by convincing her that the money has been profitably expended.

The question to consider is what class of women is best suited to secure these results. She should be matured—a housewife resents being told by too young a person how to cook. She should preferably have business experience before taking up this work, and some knowledge of cooking, but not necessarily be a domestic science graduate. It is much easier to train a woman to cook than to use discretion and tact, and to handle people with diplomacy. She should receive encouragement from the company she represents, and a systematic training be given her. Gas companies of to-day educate their men in every branch of business by bringing them together at stated intervals; and by lectures, papers, discussions, and talks, they are taught how to handle the various branches of the business. Why should not our gas companies have some definite system in training their women? Our demonstrating force could then be more aggressive in refuting the many erroneous statements made from time to time in newspapers, magazines, &c. Only a complete knowledge of the subject by the exponents of the virtues of gas as a fuel can ever bring it into the maximum use that it should, and must, attain when its advantages are understood. The demonstrator, in dealing direct with the consumer, fills one of the most important positions with the company, and has not only to educate the consumer in the uses of appliances, but also in the principles and policies of the company; and, in order to do this, she must be educated in them herself. In no other way can she be fitted to adjust complaints satisfactorily, and help to create in the community favourable public sentiment towards the gas company.

LARGE CARBONIZING CHAMBERS ON A SMALL GAS-WORKS.

A paper which was presented by Herr W. Engelking, of Weimar, at the meeting of the Association of Gas and Water Engineers of Saxony-Thuringia at Leipzig in May last, and which has been published in a recent number of the "Journal für Gasbeleuchtung," describes how it had become imperative for the authorities of the Weimar gas undertaking to decide in the winter of 1907-08 on the method which should be adopted to increase the carbonizing capacity of the Weimar gas-works. Prolonged experience was not at that date available as to the working of vertical retorts or large carbonizing chambers; but after consideration it was decided to erect an installation of inclined carbonizing chambers.

Provisionally, however, it was settled that only three settings, each containing three carbonizing chambers, should be installed, and the results obtained with these in the two ensuing winters would suffice to show whether the system should be extended. The tender of the Munich Furnace Construction Company appeared to be too high; and the construction of the settings was put into the hands of the Bros. Kämpfe, of Eisenberg. The settings had a horizontal length of 4 metres (13·1 feet), width of 0·45 to 0·50 metre (18 to 20 inches), and average vertical height of 1·8 metres (6 feet). Each chamber takes two-and-a-half metric tons of coal, and yields on the average 28,250 cubic feet of gas; consequently the output of a setting is 84,750 cubic feet per diem. In the past year, the make of gas corresponded to the theoretical production for 1170 setting-days. The question whether the unit employed is too large for a works having a make of about 100 million cubic feet per annum, may be judged from the fact that the number of setting-days with the chambers agrees pretty closely with the number of setting-days actually operated in works of similar size and conditions in which ordinary retort-settings are in use. A good deal of difficulty was experienced with the chambers at first, owing to their being brought into use before the coal-conveying plant, &c., was ready. The result was that they were not always charged at the right time, and the gas suffered in quality. The make of gas for the twelve months ending June 30 last year, averaged 11,733 cubic feet per ton of coal carbonized, and for the nine months ending March 31 last, 11,662 cubic feet. The quality of the gas was on the average from 529 to 534 B.Th.U. per cubic foot gross; all the chambers being worked throughout without steaming.

The holder used had the inlet and outlet pipes directly alongside one another; and the result was that working difficulties ensued through the poorer gas on entering the holder passing out again directly without mixing with the gas stored in the holder. As a consequence, the calorific power of the gas distributed to the town fluctuated from 471 to 628 B.Th.U. per cubic foot. Further difficulties arose through the fluctuations in the voltage of the electric current which was used for the motors of the exhausters; the result being that the pressure in the hydraulic main frequently fell below that of the atmosphere. The exhauster and bye-pass governor were much too large for the amount of gas produced at first in a single setting, and consequently the governor did not work properly in these conditions. Finally, great difficulty was caused by frequent and considerable deposits of thick tar in the hydraulic mains. Some of these troubles vanished when the equipment of the works was completed; but it naturally took longer to overcome the other difficulties. The gasholder could not be altered until July, 1909, when a sheet-metal conduit was attached to the inlet-pipe, with its far end at the opposite end of the gasholder, and there dipping about 2 inches into the water in the tank. The gas, therefore, now enters the holder at a point as far distant as possible from the outlet connection. The conduit was put in through the manhole; and it was only necessary to lower the level of the water in the tank by about 3 feet while the work was being carried out. Since the adoption of this device, the calorific power of the gas distributed has not varied more than by 21 B.Th.U. in the course of a day. The irregular working of

the exhauster was overcome by interposing a Hahn's governor before the electro-motor. The hydraulic main has been entirely dispensed with; the gas passing direct from the ascension pipes to washers, open at the bottom and sealed in open boxes. As there is no seal on the ascension pipes, each is provided with a cut-off valve. The washers are sprinkled with ammoniacal liquor sufficiently to cool the gas to about 25° C. (77° Fahr.). The water used for sprinkling brings down the high-boiling and readily condensable constituents of the tar, which otherwise would cause deposits of thick tar. These constituents of the tar are withdrawn from the sealing-boxes while hot, and thus obstruction by deposition of hard pitch is avoided. In order to meet possible requirements, a small carburettor, consisting of an ordinary gas-ring and a copper boiler, has been installed for enriching the gas in case its calorific power for any reason falls too low. This arrangement has, however, so far only been used for one to two hours on five occasions.

The coke made during the nine months ending the 31st of March last amounted to about 70 per cent. by weight of the coal carbonized; and of the total production of coke, 9·5 per cent. was breeze, and 57 per cent. was sold as large coke—*i.e.*, over two-fifths of an inch in size. The coke averaged in weight 42 lbs. per bushel. The rest of the coke was used on the works. The amount used as fuel in the producers of the settings was 22 per cent. by weight of the coal carbonized; but as the producers were charged with quenched coke containing about 17·5 per cent. of moisture, the consumption of dry coke as fuel amounted to about 18·3 per cent. of the weight of coal carbonized. This high consumption is chiefly due to the heating surfaces of the regenerator being too small. They have been extended in two settings which were erected last autumn; and in the first of these settings, which was put into action last February, the consumption of dry coke as fuel has been reduced to 15·5 per cent. The figures quoted for the fuel consumption for the nine months are based on the total consumption irrespective of whether the settings were in full work or not. The coke is very dense and solid; while coal which in retorts scarcely produced coke worthy of the name, gives quite good coke in the carbonizing chambers. Formerly a considerable proportion of the coke made was unsaleable in Weimar; but the coke made in the carbonizing chambers is all sold there, and has displaced oven coke for central heating plant. The coke fetches good prices.

Considerably higher yields of gas have been obtained over short periods; and the figures given for the average of twelve and nine months' working must not be compared with those for trials of a few days. The results of such trials are chiefly of interest for advertising purposes to the makers of settings, and are of less real significance to the gas-works manager. The untrustworthiness of short carbonizing trials may be realized from the following illustration. A setting of chambers of 84,750 cubic feet capacity per diem, as erected at Weimar, comprises about 250 tons of brickwork, of which the specific heat is about 0·22. If the setting is prepared for a special trial by not being charged for the previous 24 hours, it will be heated about 180° Fahr. above the temperature which it would have in regular working. There would thus be stored up in it 5½ million calories additional heat. The fuel consumption of such a setting is equivalent to about 8 million calories per diem. Consequently, if the reduction of the superheating by 180° Fahr. is spread over a three days' trial, there is provided heat equivalent to 23 per cent. of the heat furnished by the fuel; in other words, during the trial the fuel consumption may be 23 per cent. less than in normal working. If the trial extends to a week, the economy of fuel may still amount to 10 per cent. It is very difficult to be sure by measurement of a difference of 180° Fahr. in the temperature in a setting where the temperatures generally vary in different parts of the carbonizing chamber by more than 180° Fahr. It is thus, even with the best intentions, very difficult to make such short trials exactly and with impartiality. On this account, the author prefers to compare results of extended working only.

The yield of tar is less than from retorts; being 3·68 per cent. by weight of the coal carbonized. The tar is free from water, whereas the retort tar at Weimar contained 4 to 5., and sometimes 8 per cent., of water. In the nine months ending March 31 last, the yield of ammonia from the chambers averaged 0·234 per cent. of real ammonia; but since the washer already referred to has been introduced, the yield has risen to 0·28 per cent. by weight of the coal carbonized. The formation of scurf is small; the actual scurf removed being about one-sixth of that from retorts for the same make of gas.

The wages paid, inclusive of those of a mason and a works' fitter, averaged during the last year 2·3d. per 1000 cubic feet of gas; whereas for the retorts in the year 1908, they averaged 3·8d. per 1000 cubic feet. The wages include not merely the attendance on the settings, but also the transport of coal and coke, purification, &c. It may be observed that all the coke is transferred by forks into the conveying waggons; while the coal is discharged by hand from the railway waggons, and shovelled by hand from the coal-sheds into the conveying waggons. The service of the settings pure and simple—*i.e.*, discharging, charging, clearing ascension pipes, and attending to the furnaces—accounts for only a comparatively small part of the wages—viz., about 0·03d. per 1000 cubic feet of gas made. The chambers are charged only by the day shift; at night, one workman looks after everything.

An advantage of the settings is the small amount of naphthalene produced, owing no doubt to the top of the setting not being heated. Naphthalene obstructions are now comparatively rare. In the latter pair of settings, the idea of keeping the roofs of the chambers cool was carried too far. The roofs are only 8 inches thick, and a considerable amount of tar condensed on them. After putting a 6-inch layer of clay on the top, there was no further deposition of tar, while the production of scurf was kept quite low. The settings are protected only by a roof, and are not enclosed in a house. As, therefore, they are much exposed to the prevailing west wind, the author contemplates erecting a protecting screen on the west side, in the hope thereby of reducing loss of heat by radiation.

In regard to durability, the No. 1 setting has been in use for 690 days, the No. 2 setting for 780 days, and the No. 3 setting for 570 days. No repairs have been carried out on Nos. 2 and 3 settings; but at the beginning of last year a number of wall slabs were renewed in the No. 1 setting. This renewal was made because the slabs were warping; but it was found that the deformation did not extend further, and that the renewal of the slabs was really unnecessary. The deformation was a depression in the middle, of about two-fifths inch. The occasional failure of the coke to slide out of the chambers (entailing the use of the hand discharging machine) was at first attributed to this deformation; but it has been found to depend on the nature of the coal, and on the amount of scurf. Coal which intumesces much is not suitable for use in carbonizing chambers unless mixed with other coal, as the coke will not slide out properly. It is, therefore, necessary to test new descriptions of coal before buying. Coals from closely adjacent pits frequently differ greatly in the change of volume which they undergo on carbonization. If it is necessary to mix coals, it must be done thoroughly, as a pocket of coal which increases in volume will cause the whole block of coal to hold-up in the retort.

The cost of the new settings of four carbonizing chambers, including coal bunkers, stages, foundation, fittings, &c., amounted to £15 3s. per 1000 cubic feet productive capacity per diem, compared with £12 7s. 6d. for the old retort-settings. The chambers have some disadvantages compared with retorts—namely: As the carbonizing time is four to five times as long as with retorts, they are inconvenient for meeting great fluctuations in output, while greater attention is necessary in order to ensure uniformity in the quality of the gas distributed. The chambers have considerable advantages over retorts—abolition of night shift and better results in respect of make of gas, quality of coke, yield of ammonia, cheaper service, and reduced cost of repairs and maintenance. The author holds the view that inclined carbonizing chambers represent a considerable advance over retort-settings.

After the paper had been read, the Chairman of the meeting, Herr Martin, Manager of the Erfurt Gas-Works, invited discussion upon it, and upon the paper which Herr Weisskopf, of the Chemnitz works, had read at the same meeting, on "More Vertical Retort Results." [See "JOURNAL," *ante* p. 118.]

Herr Knoch, of Lauban, said that he had erected an installation of three settings, each containing three carbonizing chambers at the gas-works at Böhlitz-Ehrenberg about three years ago, and the Thuringian Gas Company, to whom the works belonged, would be glad to allow inspection of the chambers and to show the results obtained. The constructors' guarantees had been fulfilled; but so far the output of gas had never necessitated more than two settings being worked at the same time. Now, however, owing to a long-distance main having been laid to Wahren, the working would be on a larger scale. There was no difficulty in carbonizing coal which increased in volume in chambers, provided the heats were regulated accordingly. In coke-oven works strongly intumescing coal was frequently carbonized; and in this case the normal time for working-off was reduced to about twenty-four hours. If the heats were high, the coal swelled rapidly; and as a result the coke did not adhere so badly to the walls as otherwise. The adhesion to the walls was largely due to the amount of alkali, which entered into combination with the firebrick material.

Petrol Air Gas.—We have received from the publishers, Messrs. P. A. Gilbert Wood and Co., Limited, of Imperial Buildings, Ludgate Circus, E.C., a pamphlet on "Petrol Air Gas: The New Form of Illuminant," by Professor C. A. M. Smith, M.Sc. The author points out that though a number of firms have been started for the purpose of placing on the market apparatus designed for the generation and distribution of air gas for illuminating and heating purposes, there is practically no literature on the subject, at all events in the English language. This deficiency he has endeavoured to remedy in the pamphlet, in which he says, "odious comparisons" between the merits of different makers' apparatus have, as far as possible, been avoided. After mentioning the liquids generally employed in the production of air gas, the author explains the principles underlying the apparatus used, and subsequently describes the various kinds. The remarks on the last subject necessarily occupy the greater portion of the pamphlet. The question of cost is then taken up; and this is followed by the results of tests of a six-light plant with upright mantles, carried out at the East London College, where the author is engaged, and of another plant with bijou mantles. Next come some observations on the choice of plant and system, and the general conclusions. An appendix contains further remarks on the choice of plants and on fire insurance. The text is illustrated by a number of diagrams. The price of the pamphlet is 2s.

MIDLAND JUNIOR GAS ASSOCIATION.

A Half-Day in London.

A thoroughly good time was spent (in spite of unsatisfactory weather conditions) by the fifty or so members of the Association who came up on Saturday afternoon to pass some hours in London in the carrying out of an interesting programme, which took the place of a projected visit to the Gas Exhibition that it was at one time intended to hold at the Agricultural Hall during this month. On arrival at Euston, just before 3 o'clock, the party were met by a Sub-Committee of the Council of the London and Southern District Junior Gas Association, who had undertaken the drawing up of the programme. This Committee consisted of Mr. J. G. Clark, Mr. W. J. Liberty, Mr. D. J. Winslow, Mr. E. G. Stewart, Mr. J. Hewett, and Mr. Ernest Scears; it being generally admitted that the main portion of the work entailed in making the arrangements had fallen upon Mr. Liberty.

The City Subways.

Without delay, a start was made with the first item, which was to meet the remainder of the Council of the London Junior Association under Holborn Viaduct, and then view the system of main and service laying in the underground streets of the City. The inspection of these subways, for which the Corporation granted permission, took place under the guidance of Mr. Liberty, who pointed out all the principal features. It was in order to avoid the opening-up of busy thoroughfares that the construction of the subways was commenced in 1866; and there are to be found in them high and low pressure gas-mains, water and hydraulic supply mains, telegraph and telephone wires and cables, electric light cables, and pneumatic tubes.

Tea and Speeches.

The next thing was a reception and tea at De Keyser's Royal Hotel, Blackfriars, at which a party of over seventy sat down. Before rising from the tables, there was some interesting speech-making.

Mr. J. G. Clark, the President of the London and Southern District Junior Gas Association, said it was his privilege and pleasure to extend a hearty welcome to the members of the Midland Junior Gas Association on behalf of the London Association. When they heard that their *confrères* from the Midlands were coming to London, his Association held a Council meeting, and considered how they could make the afternoon a profitable one for the visitors. A Sub-Committee were appointed to go into details; and they arranged a programme. A portion of this had already been carried out; and when the end was reached, he thought it would be agreed that the visit had been profitable. It was specially interesting to him to be in the chair that afternoon with the Midland Junior Association, because some years ago a movement was inaugurated for arriving at an understanding by which the Junior Associations should meet together at certain times. This happened when he was Secretary of his Association, but he could not really say that he had anything to do with it, because the London Association were making such rapid strides that it took all his spare energies to keep their own work in order. They were particularly indebted to Mr. W. Upton, Past President of the London organization, for what he did, in co-operation with the officers of the other Associations, to bring about the understanding, which would be of great use to them all. They had already joint conferences; and it was only distance that prevented the different bodies meeting together more frequently. He proposed the toast of "The Midland Junior Gas Association," coupling with it the name of the President, Mr. R. J. Rogers. There was no doubt the Junior Associations had come to stay, and that they did something to enable the members to help one another. This was what they existed for.

Mr. Ernest Scears, the Hon. Secretary of the London Junior Association, supported the toast; remarking that he could not emphasize sufficiently the bond of brotherly feeling that existed between the members of the Junior Associations, and on this particular occasion the Midland and London Juniors. What little his Association had been able to do towards making the visit a success had been a real pleasure. He was afraid, however, the work had all fallen on the shoulders of Mr. Liberty, who had been responsible for the arranging of practically the whole of the programme. They in London had always watched closely the excellent work that emanated from the Midland Junior Association; and he could do nothing better than wish them the success in the future that they had enjoyed in the past.

Mr. R. J. Rogers, the President of the Midland Junior Association, in responding, said that when he saw Mr. Liberty and Mr. Clark in London a few weeks ago, and mentioned the fact that his Association contemplated a visit to the Metropolis, they cordially fell in with the suggestion that they might do something towards arranging a programme. The co-operation that had been secured between the English Junior Gas Associations, to which Mr. Clark had referred, had already done much to foster good feeling between all the members. They all knew that in London both the Gaslight and Coke Company and the South Metropolitan Gas Company had Co-partnership Journals which were doing a great deal of good in bringing the different branches of the business together; and they in Birmingham were now very shortly to follow this lead. Here, again, co-operation came in. They wanted co-operation between all the sections of an undertaking, so that all those who were employed might work together in a spirit of co-partnership and comradeship. He thanked them heartily, on behalf of the Midland Junior Association, for their warm welcome and the great pains that had been taken in drawing up the day's programme. He hoped the London Juniors would soon visit Birmingham, when his Association would do their best to make them welcome. He then proposed the toast of "The London and Southern District Junior Gas Association." Mr. Scears had, he said, mentioned that the Londoners closely followed in the Technical Press the papers and meetings of the Midland Juniors; and he could assure them that in the Midlands they followed equally closely everything that was done by the London Association.

Mr. W. J. Pickering, the Hon. Secretary of the Midland Junior Association, added his testimony to what had been stated with regard to the efforts of Mr. Liberty and other members of the London Association to make the day a success. He was sure that the visit would tend to strengthen the bond of sympathy which already existed between the two Associations.

Mr. L. F. Tooth, a Past-President of the London Junior Association, responded, and said he had been much interested in the remarks of Mr. Rogers about co-partnership and co-operation. It seemed to him that the gas industry had benefited tremendously from the introduction into it of co-partnership by the late Sir George Livesey. The creation of the spirit of co-partnership in their works and in their Associations must mean that the industry could not suffer anything, because it practically meant unity among men; and where this existed, nothing could go wrong. The object they had to strive for was unity.

Mr. Liberty proposed "The City of Birmingham," and said it was only a short time ago that in that very room they had a deputation from Glasgow practically on the same errand as themselves. That was to say, they came to see the lights of London; and he thought they went away satisfied. In one way, he wished the visit of their Birmingham friends had taken place a year later, because in the City of London the lighting was not yet complete, and it would only be possible to show them samples. In the City of Westminster, however, they would see everything complete; and perhaps later on they would come up again to inspect the City of London when the lighting scheme had been fully carried out. He found the motto of Glasgow was "Let Glasgow Flourish;" that of Birmingham was "Forward;" and that of the City of London was "Lord Direct Us." It seemed to him that if they combined these three mottoes in the spirit of their work, all would go well with them. They all knew how well to the front Birmingham was in the matter of lighting and the supply of high-pressure gas. He might point out that Mr. Frank Sumner, the Engineer to the Corporation of London, to whom they were indebted for their inspection of the subways that day, was a Birmingham man. With his toast (in the regretted absence of Councillor Wilson, J.P., who was to have been with them) he coupled the name of Mr. James Hewett, the Chief Distributing Engineer to the Birmingham Corporation Gas Department.

Mr. D. J. Winslow, Senior Vice-President of the London Junior Association, in support, remarked that Birmingham was in a proud position. In addition to its associations with Murdoch, it excelled in the manufacture of goods in which they as gas men were interested, as well as in the making of many other things.

Mr. James Hewett, a Past-President of the Midland Junior Association, responding, said it had been mentioned that the motto of Birmingham was "Forward." They were, however, not content to stop at that. They were determined to be in the front in regard to everything that was for the public welfare. Mr. Winslow had referred to the materials that now came from Birmingham; and he might also have alluded to the engineers. He (Mr. Hewett) had been associated with Mr. F. J. Bywater for a good many years; and he was quite well aware that what would be a great loss to Birmingham would be a corresponding gain to London. With respect to municipal matters, Birmingham were well in the van. They had town-planning schemes in hand; and their output of high-pressure gas was averaging more than 90,000 cubic feet per hour. There were already many big industrial consumers; and he thought that in the future a large part of the income would be derived from this source. Then, of course, there was the system which had been adopted of supplying high-pressure gas to raise the pressure in outlying districts and maintain it at a constant point throughout the twenty-four hours.

Mr. Rogers stated that he had received letters of regret for absence from several members of the Birmingham City Council. Among them was one from Sir Hallewell Rogers, the Chairman of the Gas Committee, who said he was sorry he had a previous engagement; but he hoped the members would have a pleasant day, and that the information they would obtain would be useful to them. Alderman C. W. Pinkney, the Chairman of the Smethwick Gas Committee, was also unable to be with them.

Mr. W. H. Johns, Junior Vice-President of the Midland Junior Association, proposed "The City of London," coupling with the toast the Committee in charge of the subways they had inspected that afternoon. They were also, he remarked, indebted to Mr. Liberty for having conducted them round. He fully agreed with what Mr. Hewett had said—that Mr. Bywater's removal would be a great loss to Birmingham and a great gain to London.

Mr. W. S. Smart said that, coming from Birmingham, which was now, he believed, the second city in the kingdom, he had much pleasure in supporting the toast. The welfare and prosperity of the City of London was closely linked-up with the welfare and prosperity of the country.

Rev. C. G. Britton responded with an inspiriting speech, in which he drew attention to the importance of street lighting from the point of view of public morals. He expressed his pleasure at the remarks which had been made on the subject of the co-partnership principle in the gas industry, and at learning that many undertakings were following the lead of London in the adoption of this principle.

Mr. Clark said they ought to acknowledge their indebtedness, by a vote of thanks, to the Gas Companies who were interested in the area of London which they were inspecting, for their hearty co-operation in the arrangement of the programme. He had hoped that Mr. W. Doig Gibb, the Chief Engineer of the South Metropolitan Gas Company, would have been present; but at the last moment he had been prevented. In a letter, Mr. Doig Gibb said he appreciated the work the Junior Associations were doing, and would have been glad by his presence to show his active sympathy with them. He hoped the outing would be an instructive one.

The vote of thanks was carried with acclamation, and Mr. F. W. Goodenough (Controller of the Sales Department of the Gaslight and Coke Company) and Mr. A. Stokes (of the South Metropolitan Gas Company) were asked to respond.

Mr. F. W. Goodenough, after thanking those present for the cordial way in which they had acknowledged the little the two principal Metropolitan Gas Companies had been able to do to make the visit of the Midland Junior Association a success, said he regretted the absence of Mr. Doig Gibb, but at the same time they were glad to have Mr. Stokes with them as representing his Company. He would like, on behalf of his own Company and the gas industry of London, to welcome the members of the Midland Junior Association. It was always a pleasure to do anything in his power to forward the work of the Junior Associations. These organizations were, in fact, welcomed by all responsible for the administration of gas undertakings, because they meant that the members were out for knowledge, and knowledge was at the root of success. Knowledge of themselves, knowledge of their work and the things with which they had to deal, and knowledge of their fellow-men. He hoped that they would derive some useful knowledge from an inspection of the things they had come to London that day to see; they would certainly derive profit at this meeting, as at all meetings, by gaining a better knowledge of each other; and he was sure they all, as thoughtful men, were always seeking for better knowledge of themselves. This threefold knowledge, converted into action, spelt success in business life. It seemed to him very appropriate that he should be speaking to gas men in that room, because he was standing, and they were sitting, on the site of the City of London Gas-Works, of which his great uncle was the Chief Engineer; so that from more than one point of view it was for him historic ground. The De Keyser's Hotel and the City of London School occupied the site of the old City of London Gas-Works, of which all that remained was a governor-house at the back. This was still used; and under the floor were compressors which supplied gas for the lighting of Fleet Street and district. He would also like to associate himself with the thanks expressed to Mr. Liberty, for his unflagging industry in arranging all details of the visit, which made the work of the Companies interested in the matter so light as to be practically negligible. On behalf of the Gaslight and Coke Company, he welcomed the visitors.

Mr. A. Stokes said it was his privilege, on behalf of the South Metropolitan Company, to join with Mr. Goodenough in welcoming the Midland Junior Association. Two things had been mentioned in connection with his own Company—co-partnership and the coming of Mr. Bywater. One great point about co-partnership was that, although it did not level the offices and the different positions in an undertaking, it did in one way bring all the men on to one level. In a co-partnership company, they got the brains of even the least among the workpeople; and this was surely a valuable asset in connection with the principle. As had been mentioned, Mr. Bywater was coming to take charge of the largest works of the South Metropolitan Company; and he could be assured that he would receive a hearty welcome from the officers. Speaking for himself, he was indebted to various men connected with the Birmingham Corporation Gas Department for much useful knowledge. Some years ago, he went there to see Mr. Barrett, who told him a great deal about gas-fittings, which had been of much help to them in South London in fighting the fight of gas. The part of his Company's district that they were going to see that night was a very small one; for the Gaslight and Coke Company supplied the two great cities of London and Westminster. Perhaps when Mr. Bywater was installed at East Greenwich, the Midland Junior Association might pay him a visit; and if so, they would be very pleased to show them what they were doing in the way of ordinary everyday lighting. They had nothing exceptional; but they would nevertheless be delighted to take them round the Metropolis of South London.

Street Lighting in the Cities of London and Westminster.

The speeches over, a move was made on to Blackfriars Bridge approach, where an 80-inch pressure Keith lamp and lowering gear were inspected. A demonstration of the raising and lowering was given by the South Metropolitan Gas Company, and the working was fully explained. The 80-inch pressure gas-lamps in New Bridge Street, and the 10-inch pressure inverted clusters on Blackfriars Bridge were also seen.

Then the party—some in motor-cars, and others on (or in) motor omnibuses which had been specially engaged for the purpose—proceeded to view experimental gas and electric lighting in some of the principal thoroughfares of the City—particularly the centrally hung lamps with raising and lowering gear. In Queen Victoria Street, 10-inch pressure gas-lamps were viewed; in the Poultry, high-power low-pressure gas-lamps on long brackets; and in Fleet Street, 80-inch pressure gas-lamps also on long brackets. The electric lamps included centrally hung arcs with reflectors in Cannon Street, arcs and metallic filament lamps in Watling Street, and high-power arcs on central posts in Farringdon Street. A halt was made in Cannon Street, where the Gaslight and Coke Company lowered and raised one of the high-pressure inverted gas-lamps; and another stop was made in Cheapside, where the City of London Electric Light Company arranged for the lowering and raising of one of their centrally-hung electric arcs, with dioptric lenses. By this time, the downpour of rain had ceased, and it was thenceforward possible to admire under much more favourable circumstances the splendid specimens of illumination that were seen. In fact, the wet state of the streets and clear atmosphere showed the lighting off to the best advantage.

At Temple Bar, the City of Westminster was entered; and in the course of a long ride, the party had an excellent opportunity of studying the Keith high-pressure and "Nico" low-pressure lighting recently installed in that area by the Gaslight and Coke Company. The route was through Aldwych, Kingsway, Oxford Street, Regent Street, Piccadilly Circus, Piccadilly, St. James's Street, Pall Mall, Charing Cross, Whitehall, Parliament Street, Victoria Street, and some of the side streets south of that point.

At Horseferry Road.

At eight o'clock, the party were timed to arrive at Horseferry Road; and within a few minutes of this hour they reached the offices of the Gaslight and Coke Company, and were shown the compressor station, where there are two large compressors of a capacity of 20,000 cubic feet per hour each, and two smaller ones of 10,000 and 5000 cubic feet capacity respectively. The compressed gas traverses 4½ miles of 8-inch steel main. There are upon it 150 public lamps, besides some private consumers, and the Victoria Station of the London, Brighton, and South Coast Railway Company. There are between 3000 and 4000 low-pressure lamps in the City of Westminster; and, in addition to the 150 already mentioned, there are 26 high-pressure lamps served from the Aldwych compressing station. In Regent Street there are 20 three-burner lamps; and the remainder have two burners. The maximum candle power of the two-burner lamps is 2500; and of the three-burner, about 4000. The contract, however, is for 1800 and 3000 candle power respectively; and this has been well maintained.

The workshops for the fitters' apprentices were visited. First, there is the carpenters' shop, where they are taught, among other things, how to properly take up and put down again different kinds of floor boards—useful knowledge to possess when they go out on the district. Then there is the general fitting shop, where the boys get acquainted with the various tools and their uses. Here are to be seen some good specimens of work done by boys, and also lists of those who have passed the City and Guilds and the Staff Examinations. In the next shop, there are men of different trades; and the boys work with them. This apprentice system has been in operation in the Company about two-and-a-half years. On the wall of one shop there is to be seen a "Suggestion Box" for the men and boys; and this is cleared out every month.

An opportunity was also afforded by Mr. Goodenough of inspecting the latest type of centrally hung high-power lamp service, and the method of raising and lowering. No flexible tube is used; and when lowered by means of a cable and winch, the lamp disconnects from the service-pipe. Before raising it into position again, a small spirit igniter inside is lighted; and when the lamp is in place, this relights the bye-pass. The lamp is so arranged that it will swing with the wind.

Through the courtesy of the General Manager (Mr. D. Milne Watson), light refreshments were served; and before separating, a hearty vote of thanks was accorded to the Gaslight and Coke Company, coupled with the name of Mr. Goodenough, on the proposition of Mr. S. A. Carpenter (London Junior Association), seconded by Mr. Rogers—both of whom spoke of the excellence of the gas lighting that had been inspected. In acknowledgment, Mr. Goodenough said that Mr. Milne Watson would have been pleased to be present had he not been going out of town. He readily fell in with the suggestion that hospitality should be offered to the visitors; and all his good wishes were with them. Thanks were due to the officers of the dining-club, for looking after their welfare.

The members then divided up into parties, to pass the time as best pleased them, until the hour arrived for them to take the return train to Birmingham.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

Visit to the Barrowfield Iron-Works.

The members of the Scottish Junior Gas Association (Western District), to the number of about ninety, visited the works of the Barrowfield Iron-Works, Limited, in Bridgeton, Glasgow, on Saturday last.

The visitors were received at the offices of the Company by Mr. J. Reid, the Works Manager, and were first shown photographs and drawings illustrating some of the work the firm have carried out in recent years at home and abroad, and at present under construction. Small parties were then formed, and they started on a tour through the works. These are generally stopped on the Saturday afternoon; but the Company had generously arranged that a number of men should be kept working, so that the different machines could be shown in operation, and gasholders, oil-tanks, &c., under construction. This added greatly to the interest of the visit.

The pattern-shop was first visited, where various patterns, both finished and in the making, were to be seen. The foundry came next, where the members were especially interested in the loam department—a number of large castings of sugar-pans, vacuum-pans, condenser-pipes, &c., being shown. In the smithy, the visitors saw heavy flanges for tubes being stamped under a large steam-hammer. The members then passed through the erecting shop, which is in every way suited for the quick erection of work for shipment abroad. It is complete with overhead electric crane and cutting and shearing tools. The shop is also fitted with a complete pneumatic installation of chipping, riveting, and drilling tools. Part of a large gasholder for Auckland (N.Z.) was seen in course of manufacture. It is interesting to note that this gasholder is being constructed to the designs of Mr. James Lowe, the Engineer of the Auckland Gas Company, who was the first President of the Junior Association. The erecting yard, which covers two acres of ground, and in which gasholders going abroad are put together, was next visited. The party then crossed to the yard where all the steelwork is made. In this yard are

punching, slewing, and planing machines, drills, and rolls, in great variety, and suitable for every class of steel work. A large steel oil-tank, of a million gallons capacity, was shown in process of erection. The Company have at present under construction steel oil-tanks of various capacities up to 2 million gallons. The tour was continued up to the gasholder department, where the lighter sheet work—such as gasholders, tank-covers, &c.—is done. This department is also fitted with every kind of machine for this class of work. In a template loft, all parts and details are drawn down full size, and templates made.

At the close of the inspection, the members returned to the City, where they were entertained by the Company at tea in the Corn Exchange Restaurant. Mr. Reid presided, and had on his right the President of the Association (Mr. James M'Ghee).

In a few remarks, Mr. Reid expressed the great pleasure the Company had in receiving the Junior Association at their works, and said he hoped everyone had seen something to interest him, and which might prove of use in the future. He gave a brief history of the firm, and stated that they were one of the oldest in their line in the country; having been founded by Mr. David Laidlaw, grandfather of the present generation of Laidlaws. He traced the growth of the undertaking from a small beginning in Buchanan Street, Glasgow, till their removal to the East End, on until the present day.

The President, in replying, read a letter from Mr. Ewen, the Managing-Director of the Company, expressing his regret at his inability to be present, and hoping the members would have a pleasant afternoon. Mr. M'Ghee said the members must have been surprised at the huge extent of the works, which cover seven acres, and the completeness of the plant. The connection between the Company and the Glasgow Corporation was a very old one; the Company having built the large holders at Temple and Provan. He trusted the connection would long continue. That it was continuing was proved by the fact that the Company were doing part of the work, which they had all seen that afternoon, for the vertical retort installation at Dawsholm. He thanked the Company, on behalf of the Association, for their kindness in throwing open their works to the members' inspection, and for their generous hospitality. He also thanked Mr. Reid and the other members of the firm for their kindness in showing the visitors round.

The toast of "The Barrowfield Iron-Works Company, Limited," having been pledged, Mr. Reid replied on behalf of the Company.

A very pleasant evening was subsequently spent.

WATER POWER FOR GENERATING ELECTRICITY.

The members of the Institution of Civil Engineers have lately had before them two papers describing the water-power works at Loch Leven which furnish the power for driving the hydro-electric plant in the British Aluminium Company's factory at Kinlochleven. The following particulars are taken from abstracts of the papers supplied by the Institution.

The catchment area is the basin of the River Blackwater, and is 55 square miles in extent. The site of the reservoir is favourably contoured for storage purposes; and the full reservoir is about 7½ miles in length and half a mile in breadth. Its greatest depth is 75 feet; and it impounds upwards of 20,000 million gallons of water. The Blackwater dam is 3112 feet in length, with a maximum height of 86 feet; its top surface being 1068 feet above Ordnance datum. About half its length is formed as a waste weir in six horizontal steps of 6 inches each. Water is conveyed to the pipe-track by a conduit 3½ miles in length, of square section, 8 ft. by 8 ft., and laid to a general gradient of 1 in 1000. Expansion joints are inserted in the walls at intervals of 64 feet. Along the route of the conduit, and above it, lies a catchment area of 3½ square miles, with a rainfall of about 75 inches, the greater part of which is drained by three streams. The conduit discharges its water into a penstock chamber of about 300,000 gallons capacity, where it is measured and delivered to the pipes as required. From this chamber water is conveyed to the power-house in six welded steel pipes 39 inches in diameter. The track is 1¼ miles in length; and the fall of 935 feet yields a normal static pressure of 406 lbs. per square inch.

The hydro-electric plant installed aggregates 30,660 H.P. at the generator couplings; the generators being capable of a maximum output of 21,088 kilowatts. Nine main units and two exciter units are erected; each unit consisting of a turbine and two generators. The main turbines are of the Pelton-wheel type, with two water-jets, and are designed to give 3200 B.H.P. as a maximum. Each drives two generators coupled in parallel, and having an output up to 2200 kilowatts together. The two small exciter units are also of the Pelton-wheel type, each driving a pair of generators on one shaft. These consist of an exciter and lighting-machine, capable of giving an output up to 550 kilowatts, and a traction-machine up to 94 kilowatts capacity.

The Duke of Argyll has accepted the presidency of the International Smoke Abatement Exhibition to be held at the Royal Agricultural Hall next year; and the Duke of Fife has signified his desire to support the undertaking by becoming one of the Vice-Presidents.

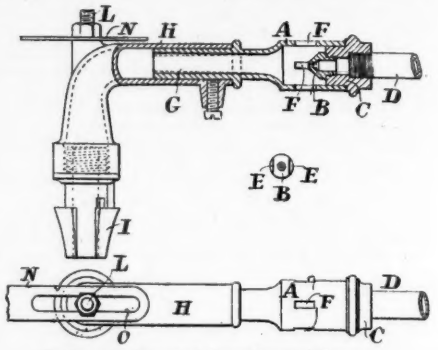
REGISTER OF PATENTS.

Inverted Incandescent Burners.

PODMORE, A. E., of Herne Hill, S.E.

No. 24,152; Oct. 18, 1910.

This is a modification of patent No. 7791 of 1908; the objects being principally to permit the use of "one standard burner which will allow of adjustment to compensate for variations in the pressure of the gas, to suit different sizes of mantles, to prevent the ingress of insects into the air or mixing chamber, and also, if desired, to allow of efficient fitting in cases where the dimensions of the lamps or lanterns vary."



Podmore's Inverted Incandescent Burner.

According to one construction (that shown), the air or mixing chamber A is not rigidly connected to the gas-supply pipe as is generally the case; but the nipple B, for the supply of gas to the air-chamber, is screwed into a connecting piece C, attached to the gas-supply pipe D. To adjust the burner for various pressures or sizes of mantles, different sizes of nipples are provided, and the air-chamber is provided with lateral holes F, for the ingress of air, and with a perforated sleeve to regulate the air apertures.

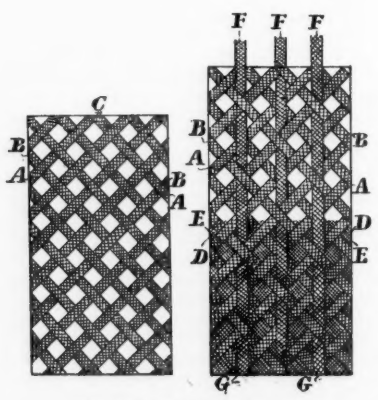
The air-chamber has mounted on it a short length of cylindrical tube G, or (as shown in dotted lines) it may slightly taper. The tube forms a spigot, which fits loosely into the cylindrical burner-tube H, or the burner-tube may be tapered. Preferably the internal diameter of the burner-tube is increased towards the lower end, and it is provided with a nozzle I. As the chamber A is merely connected to the gas-supply pipe by being pushed on to the plug or connecting piece C, means are provided for holding the chamber and the burner-tube rigidly in position—viz., a small screwed lug L at the bend. The supporting arm N is provided with a slot O, so as to allow of clamping the burner-tube in various positions to increase or reduce its length as required.

Incandescent Gas-Mantles.

ROSS, E., of Barmen, Germany.

No. 25,254; Oct. 31, 1910.

This invention relates to incandescent gas-mantles provided with strengthening means. Those previously proposed have been to strengthen ordinary knitted, plaited, or braided mantles of single cotton threads or ramie fibres by the insertion or incorporation of ribs or strands. But, according to the present invention, the mantles are manufactured of "braids, bands, or flat or hollow cords, which may, if desired, be interlaced with stiffening braids, bands, or flat or hollow cords, either during or after the manufacture of the body portion of the mantle; and this may be furnished with a fine netting of suitable material."



An Improved Ross Mantle.

The illustrations show a face view (flattened out) of a mantle made of interlaced braids or the like, and a similar view of the mantle strengthened by further braids, bands, or flat or hollow cords, the lower portion of which is furnished with fine netting.

A and B are braids, bands, or flat or hollow cords, which are interlaced so as to form the body portion of the mantle. They are composed of threads C secured together in the usual way. To further

strengthen the mantle, stiffening braids, bands, or flat or hollow cords F, composed of threads G, may be inserted after, or suitably incorporated during, the manufacture of the body portion. The mantles may be furnished with fine netting of suitable material "for more effectually filling up the apertures with impregnating fluid."

Automatically Igniting and Extinguishing Gas.

AUBERT, A. M. & J. M., of Billancourt, France.

No. 1341; Jan. 18, 1911.

There already exist, the patentees point out, appliances for automatically igniting and extinguishing gas which operate by variation of the pressure in the supply pipes—the simplest form of such apparatus consisting of a bell on which the gas pressure acts, and which bell controls the gas supply, either directly or through some intermediate member.

The present invention relates to apparatus of this general type, but in which two differential surfaces, coupled together, are superposed and made gas-tight by independent seals arranged vertically one over the other in such a way that the gas pressure is exerted effectively on either one or the other of the surfaces, but not on both at the same time.

The arrangement formed the subject of a paper read before the Société Technique du Gaz en France at their last annual meeting—see "JOURNAL" for June 27, p. 1003.

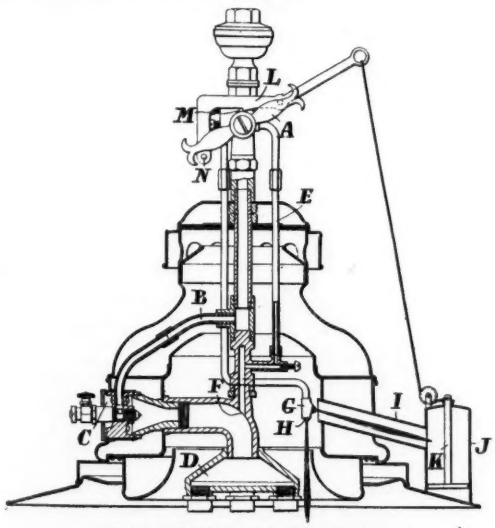
Gas-Lamps.

ANDERSON, D., of Farringdon Road, E.C.

No. 24,493; Oct. 21, 1910. No. 7313; March 23, 1911. No. 8389; April 4, 1911.

This combined invention relates to gas-lamps and to devices for igniting and extinguishing gas-burners, both for heating (in gas-stoves) and for lighting—particularly to burners of the type in which an extra supply of gas is provided at the moment of ignition and extinction "to ensure that there is present at the neighbourhood of the burners a mixture which is too rich in gas to cause an explosion such as would damage the mantles or cause back-firing."

The object of the invention is to provide devices whereby it is impossible to ignite the burners unless a rich mixture is present; and it consists (1) In providing a gas-controlling device so arranged that it is locked in the "off" position until it is operated to turn on a supply of gas for flushing the burners. (2) In the provision of means for turning on a flushing supply of gas in lamps having burners normally supplied with a mixture of gas and air; the means being actuated by the opening of the lamp or by the performance of some act necessary for lighting—such as the insertion of the torch to light the lamp. (3) In a gas-cock having the apertures for gas admission and normal gas supply in line and the apertures for flushing gas and for the lighting jet on opposite sides of the plug in a line substantially at right angles—the plug having only a single aperture.



Anderson's Lamp-Lighting Device.

The illustration is a vertical section showing the application of the invention to an enclosed gas-lamp having a number of burners and arranged for ignition by means of a torch.

The gas supply is controlled by a cock A near the top of the lamp; and the normal supply passes by the pipe B to the air and gas regulator C and the chamber D, from the lower side of which the burners are supported. The gas for flushing passes through the pipe E and joins the mixing-tube at F.

The ignition arrangements are such as to enable the lamp to be ignited by means of the ordinary lamplighter's torch—the pilot light being dispensed with. The pipe for supplying the igniting flame in this case is terminated in an exit-piece formed with two jets G H—one projecting a stream of gas in a lateral direction through a pipe I to a chamber J, in which there slides a plunger having a rod K attached to it and connected by a flexible cord over a pulley with an arm on a pivoted lever L. The other jet projects a stream of gas vertically downwards to the neighbourhood of the burners. The lever carries a pawl adapted to engage with a projection M on the cock, so that it is prevented from rotating until the arm has been moved downwards by the upward movement of the plunger. The lever also carries a pin N adapted to engage with the cock A and turn it through a distance sufficient to turn on the flushing gas supply. The further movement of the cock is effected by engagement of one or other of the arms of the cock by means of the torch or in some other suitable manner; but the cock cannot be turned to turn on the gas unless the lever arm has been first operated.

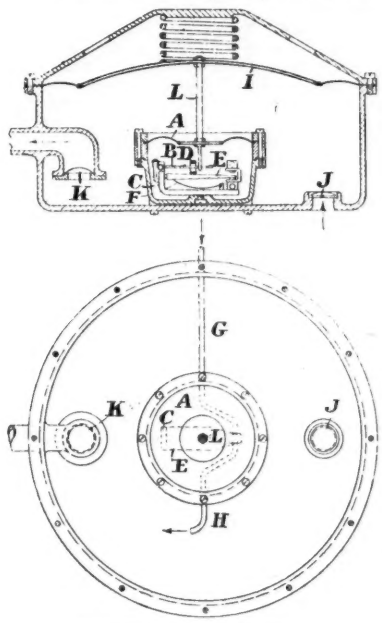
Instead of using a plunger pipe operated by the torch as described, the jet or gas passage from the double ignition jet to the outside of the lamp may be carried down along the casing of the lamp and end in a trap which is operated by the torch to turn on the flushing gas—the trap being connected to the cock as described or some other suitable manner. The cock may also, if desired, be arranged to turn on first one light and then two or more as required; but in each case, before ignition takes place, the burner-tube and mantle have been flushed, so that ignition only takes place when there is a mixture sufficiently rich to prevent explosion.

Producing a Mixture of Gas and Air.

DALÉN, G., of Stockholm.

No. 30,197; Dec. 29, 1910. Date claimed under International Convention, Dec. 31, 1909.

According to this invention, air is sucked into a chamber against the action of a spring, and afterwards forced into the air-chamber (instead of directly into the consumption conduit), so as to mix with the air contained in it. From this air-chamber the mixture is forced into a consumption conduit by means of the pressure of the spring.



Dalén's Mixer for Gas and Air.

Figs. 1 and 2 of the accompanying illustrative drawing shows, in central vertical section and in plan, respectively, mixing apparatus embodying this invention.

The small central casing shown is closed by a diaphragm A connected with an arm B, mounted to turn on a point on a member C and arranged to work in a stirrup or slot in an arm or lug D secured to a valve-plate E, mounted to rock on points. Arranged to bear against it is a spring F. The end of the valve-plate moves between two valves seats—one constituting the mouth of the gas-supply pipe G, and the other the mouth of the outlet pipe H. The spring tends to move the valve-plate towards the valve-seat.

The casing is located within a second casing closed by a diaphragm I and provided with a suction valve J communicating with the external atmosphere, and with a pressure valve K communicating with an outlet conduit. Arranged to bear upon the diaphragm I is a pressure spring, and the diaphragm is connected with the diaphragm A by a rod L. The strength of the spring is not sufficient to overcome the pressure of the gas introduced into the smaller casing through the inlet pipe G.

The apparatus operates as follows: In the position in which the valve-plate E is shown, gas under pressure flows through the pipe G into the smaller casing, in consequence of which the diaphragm A rises, carrying with it the diaphragm I against the action of the spring. Owing to the vacuum thereby produced in the larger casing, the suction valve J opens, so that air flows in. As soon as the arm B, which is connected by a link with the diaphragm A, reaches the upper edge of the stirrup or slot in the arm or lug D, the valve-plate E is also moved by the diaphragm A, whereby the valve-plate leaves its one seat and abuts against the other one.

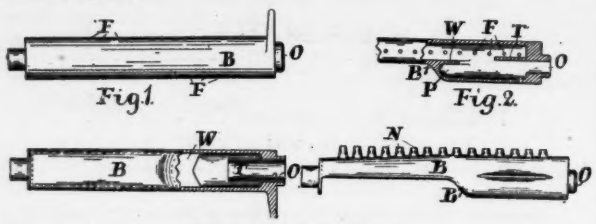
The gas flows out from the smaller casing through the outlet pipe H into the larger casing J, whereby the valve is closed and the pressure in the smaller casing is diminished. As soon as this pressure is overcome by the strength of the spring, it presses the diaphragm downwards, and thereby also moves the diaphragm A downwardly, so that the gas in the small casing is forced into the larger one, and the gas mixture produced therein flows out through the valve K, which is opened by the pressure. When the arm B abuts against the lower edge of the stirrup or slot in the arm D, the valve-plate E is carried with it in the movement downwardly, whereby it is pulled from one of the valve seats and is carried over to the other one, after which the operation is repeated.

Gas-Stove Burners.

WILSON, W. A., of Armley, near Leeds.

No. 4569; Feb. 23, 1911.

This invention relates to burners (adapted for use with gas fires, cookers, grillers, stoves, and the like) which have perforations in their whole length; the patentee's object being to arrange and construct a burner of this class so that practically the whole length of it may be utilized for the flame jet orifices along the sides, top, or both—such flame jets being of equal length, with the result that there is no danger of back-lighting.



Wilson's Gas-Stove Burner.

Fig. 1 represents a plan and an inverted plug of a burner provided with side flame jet orifices. Fig. 2 represents an elevation of a burner adapted for gas-fires.

The hollow burner-tube B has gas and air admission opening O at one end, arranged in conjunction with a gas supply in the ordinary manner and provided with flame jet orifices F along one or both sides and top and for the whole available length.

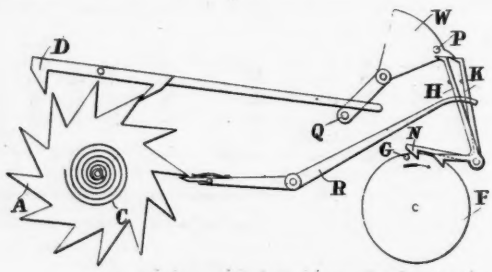
In place, however, of forming one central aperture throughout the length of the burner, what might be termed two chambers are employed in the space of one pipe. The underside B^1 of the burner B is enlarged, and a pocket is formed by employing a web W of suitable length. The length of the web is important, and depends on the length and diameter of the burner. That shown is found satisfactory when employed with a burner having a gas and air admission opening of $\frac{3}{4}$ inch and a length of about $8\frac{1}{2}$ inches. Such web is shown in fig. 1, made with a V-shaped edge (the form usually obtained from ordinary casting); if straight, the web will be rather shorter. The gas thus has a free passage along the burner as regards one portion; but in the lower or enlarged portion, the pocket and web act as a baffle. To further divide the entrance end of the burner, a tube T (fig. 1), or a division plate T^1 (fig. 2), projects some little distance (say, 2 inches for a burner of the size named) into the burner as shown. With a burner of ordinary length, this arrangement enables flame jet orifices F to be formed along the whole available length of the burner, and "the jets will be found equal in length." Where, however, a larger burner is employed, the arrangement may remain as before; and to ensure the flames being all of equal length, the burner may be tapered towards its closed end as shown in fig. 2.

Prepayment Mechanism for Gas-Meters.

SPRAGUE, W. S., and CHAMBERLAIN AND HOOKHAM, LIMITED, of Birmingham.

No. 11,929; May 17, 1911.

This invention relates more particularly to prepayment mechanism for gas and like meters, in which an escapement lever is operated by the meter to control the movement of, and cut off the supply by, the prepayment mechanism—the escapement lever being operated by a weight released by the meter and returned by a spring or weight wound up by hand.



Sprague's Prepayment Meter Mechanism.

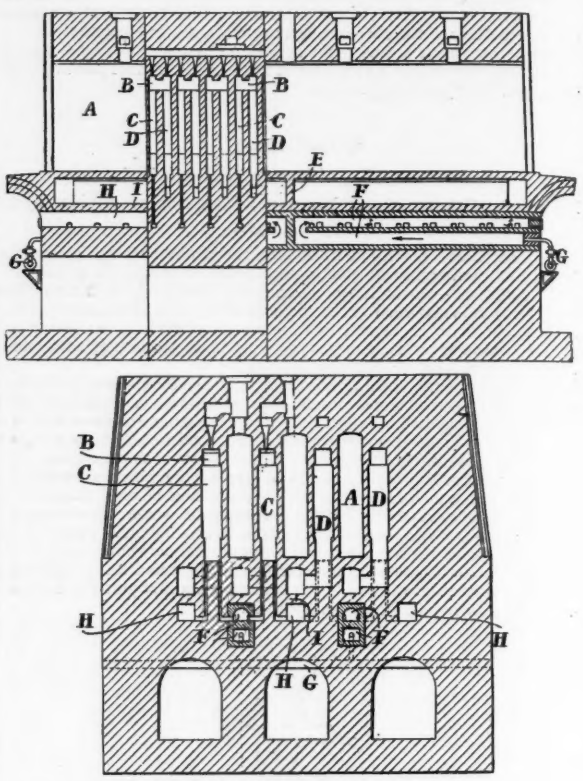
The operation of the device shown is as follows: The toothed wheel A is rotated on the insertion of coins by the engagement of the coins themselves with the teeth; each coin rotating the wheel through the distance of one tooth. The spring C is thus tensioned; and the return movement of the wheel can only take place as allowed by the escapement D. Assuming that the wheel has been rotated some distance by the insertion of coins, and that the meter is in operation during the consumption of the supply, the pin G on the wheel F will be revolved by the meter train until it engages the arm N, thus lifting the lever K and allowing the weight W to fall so that its pin P rests upon the top of the lever H. Further revolution of the wheel F will, in turn, trip the lever H, thus allowing the weight to fall. This movement of the weight raises the pin Q, which moves the escapement D, thus allowing the wheel A to rotate one tooth in a clockwise direction under the action of the spring. This movement of the wheel depresses one end of the lever R, thus raising the other end, which meets the falling weight W and returns it, where it is caught in the original position resting on the top of the lever K. The duplication of the trip levers H and K serves to prevent any possibility of failure of the weight being caught on its return upward movement, since the lever K, having been tripped by the pin G some time before the trip of the lever H and the consequent movement of the weight, is entirely free of the pin G and cannot be hindered thereby from catching the weight.

Horizontal Coke Ovens or Retorts.

OFENBAU-GESELLSCHAFT, of Munich.

No. 6617; March 16, 1911. Date claimed under International Convention, April 27, 1910.

This invention relates to ovens or retorts in which the direction of the heating gases always remains constant—the lateral walls of the adjoining retorts forming the vertical heating flues supplied from below with heating gases. The conduits through which the gases always flow (in the same direction) are formed into recuperators by being arranged parallel to the discharge conduits through which the waste gases constantly pass. A dividing wall separates the gas supply conduits and those through which waste gases are discharged, and enables the gases in the latter to impart some of their heat to the incoming heating gas, which thus receives a preliminary heating to a constant extent.



Munich Horizontal Coke Ovens or Retorts.

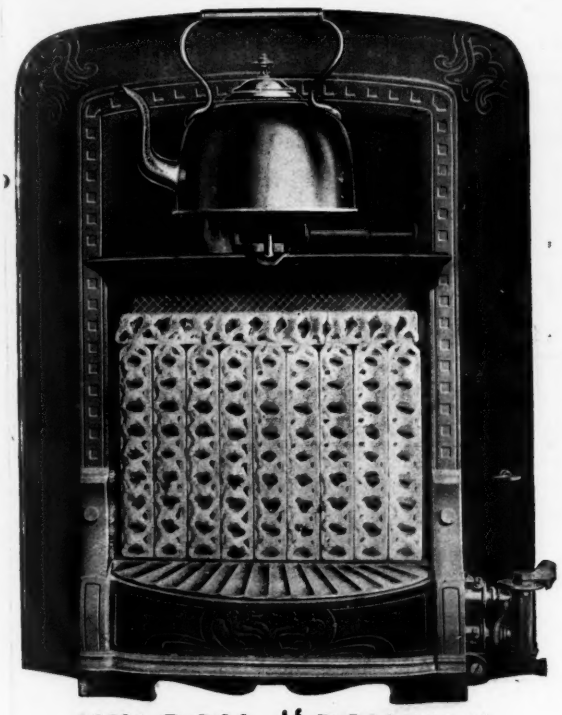
Three constructions of oven or retort setting are illustrated in the specification. That reproduced shows the setting in sectional elevation and a portion of the setting in vertical section.

The arrangement comprises adjacent retorts or ovens A, the lateral walls of which form heating flues B; each having an ascending portion C and a descending portion D. The descending portions are connected by right-angle branch conduits to a waste-gas or discharge conduit below the retorts and extending parallel to the length of the setting. This discharge conduit communicates in the usual manner by means of a passage with a regenerator or recuperator (not shown). Each discharge conduit is divided by a vertical partition E into two halves; and under alternate conduits gas supply conduits F are provided. Each conduit (divided into two halves by a vertical partition) extends parallel to its respective discharge conduit, from which it is separated by a wall, so that an exchange of heat is effected between the gases in the conduits. The gas supply conduit extends below the waste-gas or discharge conduit, and each half of it is divided by a horizontal partition into two superimposed chambers communicating at their inner ends. From the upper chamber, branch conduits lead to the burner-nozzles in the ascending portions of the heating flues.

The gas from the producer is led to both sides of the furnace through the main supply pipe G and by a branch pipe into the lowermost chamber of the gas supply conduits F. The gas passing through these conduits enters the upper chamber, whence it flows through the branch conduits to the burner-nozzles of the individual heating flues B.

The quantity of gas passing to the burner-nozzles can be regulated (as required) by valves or slides, either arranged in the branch conduits or in the upper chambers of the conduits F. The regulating valves are in the form of slide blocks (preferably made of refractory material), adjusted from the outside by means of a rod through inspection apertures arranged at each side of the setting and opening into the main passages extending along each side of the setting.

Below the alternate discharge conduits—*i.e.*, between the gas supply conduits F—air supply conduits H are provided extending parallel to the discharge conduits and connected by branch passages to the heating flues. Each air supply conduit is separated from its discharge conduit by a wall I, which enables heat to be exchanged by the gases in the air and discharge conduits, so that the combustion air receives a preliminary heating from the waste gases in the same way as the heating gas.



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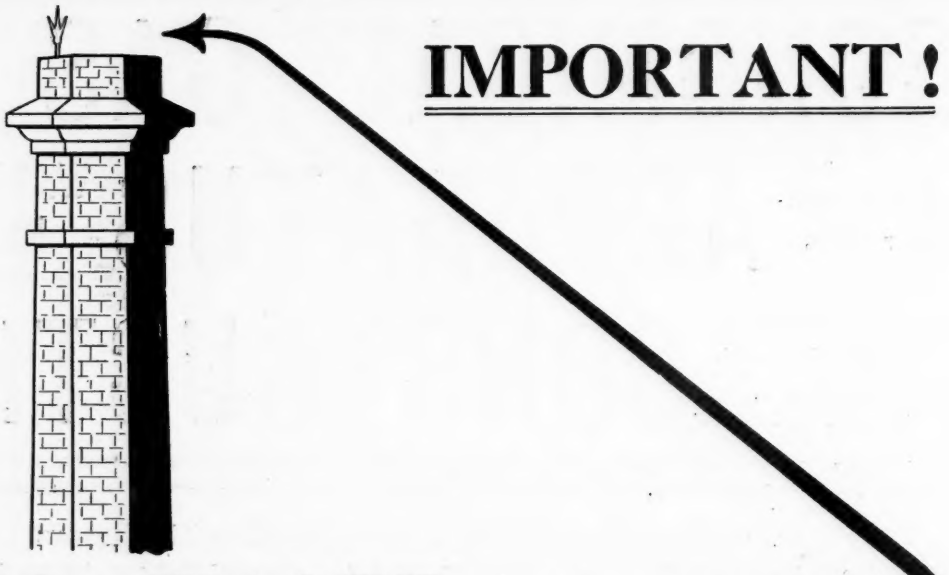

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PARLIAMENTARY INTELLIGENCE.

IMPORTANT GAS PROJECTS FOR NEXT SESSION.

Large Amalgamation Scheme of the South Suburban Gas Company.

Notice has been given by the South Suburban Gas Company of their intention to apply to Parliament for authority to acquire the undertaking of the Bromley and Crays Gas Company, to extend their limits of supply so as to include the parishes of Cudham, Downe, Halstead, and Knockholt, and also to effect an exchange of area with the West Kent Gas Company, whose undertaking is to be transferred to the South Suburban Gas Company. The acquisition of the Bromley and Crays Company is to be on such terms and conditions, and subject to such provisions with regard to liabilities and obligations, as may have been agreed upon or as may be prescribed by the Bill, which will, of course, contain the necessary financial provisions incidental to the transfer.

It is proposed to make such special provisions as may be specified in the Bill with respect to the actual price to be charged for gas supplied by the South Suburban Company within their extended area, whether for public lighting or private lighting or any other purpose, and to authorize the charging at different rates or prices for gas supplied in different parts of the area of supply.

Any differential price so charged will not be taken into account in ascertaining the rate of dividend payable by the Company upon their ordinary stock under the provisions applicable to them with respect to the sliding-scale of price and dividend. Provision will be made for the transfer to the South Suburban Company of all or any of the officers and servants of the Bromley Company, and with respect to the terms of their employment and to compensation and gratuities to those removed from office. Compensation will be paid to Directors and Auditors of the Bromley Company for loss of office.

As already mentioned, provision is to be made for an exchange of areas by the South Suburban and West Kent Gas Companies. Certain parts of the parishes of Bexley will be excluded from the area of the latter Company, and they will have in exchange part of the parish of North Cray. The Bill will provide for the transfer of the undertaking of the West Kent Company upon such terms and conditions as may have been agreed upon, or as may be prescribed. The other provisions of the Bill include the allowance of discounts to consumers, the fixing of the remuneration of the Secretary and Directors, the creation of a special purposes fund, and the increase of both capital and borrowing powers.

In connection with the notice above referred to, it may be mentioned that application will be made to the Board of Trade by the West Kent Gas Company for authority to manufacture and store gas and residual products on land, about 5 acres in extent, belonging to them in the parish of Erith, and adjacent to the River Thames; and to apply their existing funds for the purpose.

Additional Gas Lands for Birmingham.

In a Bill to be promoted by the Corporation of Birmingham to enable them to carry out some important tramway extensions, a clause will be included with respect to their gas undertaking. Authority will be sought to acquire further land and erect works for the manufacture and storage of gas and residual products, and for the other purposes of the undertaking. The land is situated in the parish of Aston, in close proximity to sidings of the Midland Railway and to a branch of the London and North-Western Railway.

Extended Powers for the Salford Corporation.

The Corporation of Salford will seek authority to acquire certain lands in the parish of Salford, and erect thereon works for the manufacture and storage of gas. The Bill to be promoted will contain provisions with respect to the application of the revenue derived from the gas undertaking and to the allocation of profits; and the Corporation will ask to be allowed to differentiate in the price of gas within such parts of their limits of supply as may be defined by the Bill or prescribed by Parliament. It is proposed to amend or repeal the provisions of the Acts relating to the gas undertaking in regard to the illuminating power and testing of gas, and to make other provisions with respect to illuminating power, purity, and testing, and the apparatus to be used therefor. The Corporation wish for power to raise more money for, or in relation to, the gas undertaking.

Proposed Extended Adoption of the "Metropolitan" No. 2 Burner.

Application will be made by a group of gas companies for sanction to the adoption of the "Metropolitan" No. 2 burner, or any other burner which the Board of Trade may approve, as a standard burner, in substitution for the various burners now in use for the official testing of the illuminating power of gas supplied by the several companies. The Bill will define the conditions and method of testing with the proposed burner, and the regulations to be observed in order to correct the volume of the gas consumed therein to the standard atmospheric pressure and temperature. The companies associated in the promotion of this Bill are the following: Ashton, Brierley Hill, Dudley, East Grinstead, Folkestone, Gravesend and Milton, Horley, Portsea Island, Redhill, Rugby, Southend, Stroud, Sunbury, Sutton, and Whitby.

Proposed Gas Workers' Benefit Funds.

One of the measures prepared for next session is a Bill to empower the Brighton and Hove, East Cowes, Lea Bridge, Maidenhead, North Middlesex, St. Albans, and Southgate and District Gas Companies to establish a benefit fund for their servants and their dependants. We are indebted to Mr. Ernest L. Burton, F.S.A.A., the Secretary of the Brighton and some of the other Companies named, for a print of the Bill, from which the following particulars are taken. The preamble sets forth that it is expedient that power should be given to the promoters "to establish a fund for the purpose of granting pensions and other allowances, payments, and benefits to their servants, and to the widows, families, and dependants of such servants." Clause 3 gives the directors this power. It is provided that they may, in respect of any year, appropriate out of the revenue, as part of the expenditure on revenue account, any sum not exceeding ½d. per 1000 cubic feet of gas supplied during such year to a fund to be called the "benefit fund." The fund, according to clause 4, is to be applied in granting a gratuity or making pension or other allowances, payments, or benefits to any servant who may be disabled or injured in, or be retired from or become incapacitated from continuing in, the service, or to the widow or family or dependants of such servant, and on such terms and conditions as to contributions as the directors may think fit. Participation in any arrangement made under the proposed Act is not to be obligatory. The Bill contains provisions enabling directors to enter into agreements with insurance companies or other associations for securing to their servants or those depending upon them gratuities, pensions, or other allowances, payments, or benefits, and the expenses are to be defrayed out of the fund. The moneys forming the fund are to be invested in trustee securities, or such others as may be sanctioned by resolution. The pensions are not to be assignable. Any scheme involving contributions from servants formulated under the proposed Act is to be registered under the Friendly Societies Act, 1896.

GAS AND WATER PROVISIONAL ORDERS FOR 1911.

The Board of Trade have issued a report upon their proceedings under the Gas and Water Works Facilities Act, 1870, during the first part of the present session. It shows that last December twenty-five applications were made to the Board for Provisional Orders—twenty relating to gas, three to water, and two to gas and water undertakings. The amount of capital proposed to be authorized was £317,000 by shares and £111,431 by loan—£288,000 share and £101,431 loan capital being for gas, and £29,000 share and £10,000 loan capital for water purposes. The Gas Orders related to Alfreton, Barnstaple, Burnham, Busby and District, Cannock, Clay Cross, East Hants, Herne Bay, Holyhead, Hythe and Sandgate, Launceston, Lichfield, Llangefni, Llanrwst, Longford, Petersfield and Selsey, Preston, Pwllheli, Uxbridge, and Witney and District; the Water Orders to Blandford, Guisborough, and West Gloucestershire; and the Gas and Water Orders to North Pembrokeshire and Sheringham.

Gas Orders.

The principal objects of the applications in regard to gas were to confer the following powers upon the respective Companies: Alfreton Gas Company, to acquire additional land for the manufacture and storage of gas and residual products. Barnstaple Gas Company, to extend the limits of supply and to acquire additional lands. Burnham Gas Company, Limited, to maintain and continue gas-works, and manufacture and supply gas within the urban district of Burnham-on-Crouch and the parishes of Creeksea, Althorne, and Latchingdon, in the county of Essex. Busby and District Gas Company, Limited, to maintain and continue their existing gas-works in the parishes of Cathcart and Mearns, in the county of Renfrew, and to supply gas within part of the parish of Mearns and parts of the parishes of East Kilbride and Carmunock, in the county of Lanark. Cannock, Hednesford, and District Gas Company, Limited, to extend their limits of supply and acquire additional lands. The owner of the Clay Cross Gas-Works, to extend the limits for the supply of gas authorized by the Clay Cross Gas Order, 1902. East Hants Gas Company, Limited, to raise more capital. Herne Bay Gas and Coke Company, Limited, to construct additional gas-works and acquire lands. Holyhead and North Wales Gas and Water Corporation, Limited, to maintain and continue existing gas-works, and to manufacture and supply gas within the urban district of Holyhead and part of the rural district of Valley, both in the county of Anglesey. Hythe and Sandgate Gas Company, to raise additional capital. Launceston Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas within the borough of Launceston and parts of the parishes of St. Thomas the Apostle Rural and St. Stephen by Launceston Rural, in the county of Cornwall. Lichfield Gas Company, to extend the limits of supply. Holyhead and North Wales Gas and Water Corporation, Limited, to maintain and continue existing gas-works, and to manufacture and supply gas within the urban districts of Llangefni, in the county of Anglesey, Llanrwst, in the county of Denbigh; and also in the borough of Pwllheli and the parish of Denio, in the county of Carnarvon. Longford District Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas within the urban district of Longford and adjacent parishes. Petersfield and Selsey Gas Company, to raise additional capital. Preston Gas Company, to reduce the illuminating power of their gas. Uxbridge Gas Company, to extend their limits of supply, maintain and continue existing gas-works, and construct and maintain further works; also to confirm the acquisition by the Company of the undertaking of the Amersham Gaslight and Coke Company, Limited. Witney Gas and Coke Company, Limited, to maintain and continue existing gas-works, construct and maintain further works, and manufacture, store, and supply gas in the urban district of Witney and certain parishes in the county of Oxford. Ten of these applications—viz., those from Burnham, Busby and District, East Hants, Holyhead, Launceston, Llangefni, Llanrwst, Longford, Pwllheli, and Witney and District—were in respect of existing non-statutory undertakings. All the others related to undertakings already authorized by Special Acts or Provisional Orders.

Opposition.

There was no opposition to the Lichfield application; and the objections lodged in the cases of Burnham, Clay Cross, Hythe and Sandgate, Longford, and Witney and District were withdrawn.

The objections made in respect of the Alfreton, Barnstaple, Busby and District, Cannock, Holyhead, Launceston, Llangefni, Llanrwst, Preston, Pwllheli, and Uxbridge applications were fully considered by the Board of Trade, and in each case an inquiry was held at the offices of the Board.

The promoters of the Cannock and Uxbridge Orders, having failed to obtain the consent of some of the local and road authorities concerned, requested the Board to dispense therewith. It appeared that the Cannock Urban District Council had refused their consent to the Cannock application unless a clause providing for the immediate purchase of the undertaking by the Council were inserted in the Order. Certain negotiations took place between the Council and the promoters, and ultimately the Board were informed that no agreement had been arrived at with respect to this clause, but that the Council and the promoters had agreed to the insertion of a clause applying the provisions of section 40 ("as to the purchase of the undertaking by the Cannock Urban District Council") of the Cannock Gas Order, 1898, to the undertaking as proposed to be extended by the Draft Order. In these circumstances the Board decided to allow the Order to proceed, and dispense with the consent of the Council.

Certain other local and road authorities had refused their consent to the Order on the ground that, owing to the scanty population, it was unlikely that the undertakers would extend their mains into the districts of these authorities for a considerable time, and that meanwhile neighbouring gas undertakings, which might be able and willing to supply, would be unable to do so. After full consideration, the Board decided to exclude certain districts from the limits, and to dispense with the consent of the authorities concerned in the districts which were not so excluded.

In the case of the Uxbridge application, the Hertfordshire County Council withheld their consent owing to the refusal of the promoters to agree to the insertion of a special clause for the protection of the roads and bridges under the control of the Council. It appeared, however, that under the provisions of the Draft Order, the Council would receive similar protection to that afforded to the Middlesex County Council by the Uxbridge Gas Act, 1906; and therefore the Board decided to dispense with the consent of the County Council.

Three of the applications—viz., those from East Hants, Herne Bay, and Petersfield and Selsey—were withdrawn by the promoters; but in the case of each of the other applications, the Order applied for was granted, subject to such modifications and amendments as seemed to be required.

Price of Gas.

In the following Orders, a maximum price per 1000 cubic feet of gas was fixed: Burnham, 4s. 9d.; Holyhead, 5s.; Llangefni, 5s. 4d.; Llanrwst, 5s. 4d.; and Pwllheli, 5s. In the Witney and District Order, a maximum price of 5s. was fixed; but an increase to 6s. was allowed in certain parishes. A standard price, with a sliding-scale as to dividends, was fixed in the following cases: Busby and District, 5s.; Cannock, 3s. 3d.; Hythe and Sandgate, 4s.; Launceston, 4s.; and Preston, 3s. 4d. In the Barnstaple Order, a standard price of 3s. 6d. was fixed in place of the maximum price of 4s. 3d. authorized by the Barnstaple Gas Act, 1869; but the maximum price of 3s. 10d. for gas supplied to public lamps was continued. A differential price of 6d. per 1000 cubic feet was allowed in the new area of supply authorized by the Order. A standard price of 5s. was fixed in the case of the Longford Order; but a provision was inserted, by agreement with the Longford Urban District Council, limiting the price to be charged within the urban district for three years after the commencement of the Order to 5s. 3d. for lighting purposes, 4s. 6d. for cooking and heating, and 4s. for motive power.

Illuminating Power.

An illuminating power of 14-candles was prescribed in the Barnstaple, Burnham, Busby and District, Cannock, Holyhead, Launceston, Llangefni, Llanrwst, Longford, Preston, Pwllheli, and Witney and District Orders; and in each case the "Metropolitan" No. 2 burner was prescribed as the test-burner. The illuminating power previously prescribed in respect of the Barnstaple undertaking was 15 candles, and in respect of the Preston undertaking 18 candles. In the Preston Order, the standard price of gas was reduced; and the undertakers were required, in consideration of the reduction allowed in the prescribed illuminating power of the gas, to supply new burners to consumers free of charge. Provision was also made for the redemption of obsolete capital of the undertakers to the extent of £100,000.

Special Provisions.

A clause was inserted in the Burnham Order providing that, after five years from the commencement of the Order, the powers of the undertakers to supply gas in the parish of Latchingdon are not to preclude the Local Authority or any company, body, or person from obtaining powers, under an Act of Parliament or Provisional Order, to supply gas in any part of that parish not then supplied; and that, on such powers being obtained, the powers of the undertakers over such area are to cease. In the Cannock Order, a clause was inserted providing that the price of gas for public lighting supplied to the Cannock Urban District Council shall not exceed the lowest price charged to any private consumer for lighting purposes. The Llangefni, Llanrwst, and Pwllheli Orders each contain agreed clauses providing for the purchase of the undertakings by the respective Local Authorities, if, within six months after the expiration of five years from the commencement of the Order, authority shall be given to purchase. A clause was also inserted, by agreement, in the Longford Order relating to the purchase of the undertaking by the Longford Urban District Council. Clauses were inserted, by agreement, in various Orders for the protection of road and other authorities.

Water Orders.

The principal objects of the applications for Water Orders were as follows: To extend the limits of supply of the Blandford Water Company, Limited, and to sanction and confirm the extension of their existing reservoir; also to empower the Company to construct new water-works and acquire land. To empower the undertakers of the Guisborough Water-Works to increase the capital of the undertaking. To authorize the West Gloucestershire Water Company to take a supply of water in bulk from the Clutton Rural District Council, and to make agreements with reference thereto. All these applications were in respect of undertakings already authorized by Special Acts or Provisional Orders.

Opposition.

Several objections were lodged against the Blandford and Guisborough applications, and inquiries were accordingly held at the offices of the Board. After full consideration, the Board granted an Order in each case, with considerable modification and amendment of the proposed provisions. There was no opposition to the West Gloucestershire application; and the Board granted an Order, subject to certain amendments which they considered desirable.

Special Provisions.

A clause for the prevention of plumbism was inserted in the Guisborough Order. The West Gloucestershire Order contains a clause authorizing the undertakers, subject to the consent of the Local Government Board, to make agreements with the local authority of any district partly within and partly beyond the limits of supply with respect to the supply of water in bulk to the undertakers.

Gas and Water Orders.

The objects of the applications for Gas and Water Orders were to empower the North Pembrokeshire Water and Gas Company to raise unissued capital by preference shares, and the Sheringham Gas and Water Company to raise additional gas and water capital. Both of these applications were in respect of undertakings authorized by Special Acts. There was no opposition to the Sheringham application; and the objections lodged against the North Pembrokeshire application were withdrawn.

Confirmation Bills.

Bills to confirm the Orders granted by the Board were introduced in the House of Lords, as follows: No. 1. to confirm the Alfreton, Barnstaple, Burnham, and Launceston Gas Orders; No. 2, the Cannock, Clay Cross, Hythe and Sandgate, Lichfield, and Witney and District Gas Orders; No. 3, the Holyhead, Llangefni, Llanrwst, and Pwllheli Gas Orders; No. 4, the Busby and District, Longford, Preston, and Uxbridge Gas Orders; and the Gas and Water Orders Confirmation Bill, the Blandford and Guisborough Water, the North Pembrokeshire Water and Gas, the Sheringham Gas and Water, and the West Gloucestershire Water Orders.

Opposition in Parliament.

A petition was lodged against Bill No. 2, in respect of the Cannock Gas Order, by the Cannock Urban District Council. Clauses were, however, agreed between the parties, and the petition was withdrawn.

Bill No. 4 was petitioned against by the Glasgow Corporation, in respect of the Busby and District Gas Order; by the Preston Rural District Council, in respect of the Preston Gas Order; and by the Hertfordshire County Council, in respect of the Uxbridge Gas Order. Petitions against alterations were lodged by the Renfrew and Lanark County Councils, in respect of the Busby and District Gas Order; and by the Preston Corporation, in respect of the Preston Gas Order. The Corporation of Glasgow objected to the inclusion within the limits of supply of the Busby and District Gas Company, Limited, of a portion of the parish of Mearns. The Committee of the House of Lords decided to insert a clause in the Order providing that the district in question should not continue within the limits of supply under the Order, if the Corporation should, in the session of 1912, obtain power to supply that district. The petition of the Preston Rural District Council against the Preston Order was withdrawn.

The Hertfordshire County Council desired the insertion in the Uxbridge Order of a clause providing that the Council should not be liable for damage caused by a reasonable exercise of their powers as a road or bridge authority, and that the use of a steam-roller not exceeding 15 tons in weight should not be an unreasonable exercise of such powers. The Committee of the House of Lords refused to insert the clause asked for; but they allowed an amendment providing that the protective clause already in the Order should be in addition to any other provision relating to the Uxbridge undertaking which might protect the Council. The County Council again petitioned against the Bill in the House of Commons. The Committee refused to insert the clause asked for, but allowed an amendment requiring claims for damage to be made within 48 hours of the discovery of the damage.

A petition against the Gas and Water Orders Confirmation Bill, in respect of the Guisborough Water Order, was lodged in the House of Lords by the Guisborough Urban District Council. After hearing evidence, the Committee decided to reduce the maximum price for water supplied by measure from 1s. 6d. to 1s. per 1000 gallons.

With the foregoing exceptions, the Orders were unopposed; and all the Confirmation Bills received the Royal Assent on Aug. 18.

Abandonment of the Paris Light-Tax.—It appears that the French Government have had some doubt as to being able to enforce payment of the tax on gas and electricity proposed by the Budget Committee. They have therefore definitely abandoned the project, and will seek in another direction the sum necessary to make up the Budget.

Cannock District Council and the Gas-Works.—As stated in the article on the Provisional Orders for 1911 which appears above, the Cannock Urban District Council have obtained power to acquire the undertaking of the Cannock, Hednesford, and District Gas Company, Limited. The question of purchase recently came before the Council. A sum of £72,000 had been agreed upon as a fair purchase price; and this was approved by the accountants consulted, who advised the Council to go forward with the scheme. This they agreed to do.

Cavan Gas Company Wound Up.—In the Chancery Division of the High Court of Justice of Ireland last Tuesday, before the Master of the Rolls, a petition was presented to have the Cavan Gas Company wound up. It appeared, however, that an order to this effect had been made a week previously on a petition presented by Mr. Henry L. Lawther, coal merchant, trading as Lawther and Harvey, at Corporation Square, Belfast, and that a reference had been made to Chambers to appoint a Liquidator. On the application of Mr. H. Wilson, on behalf of Mr. Lawther, Mr. T. R. Burns, accountant, was appointed by his Lordship provisional Liquidator.

LEGAL INTELLIGENCE.

WATER SUPPLY TO FACTORIES.

HOUSE OF LORDS.—Tuesday, Nov. 7.

(*Before the* LORD CHANCELLOR, *Lord* ATKINSON, *Lord* SHAW OF DUNFERMLINE, *and Lord* MERSEY.)

Colley's Patents, Limited v. Metropolitan Water Board.

This was an appeal by Colley's Patents, Limited, from an order of the Court of Appeal (Lords Justices Farwell and Kennedy, Lord Justice Vaughan Williams dissenting), which reversed the orders of the Divisional Court (Justices Phillimore and Coleridge) and of the Westminster County Court Judge. The previous proceedings have been reported in the "JOURNAL." [See Vol. CXI., p. 402; Vol. CXII., pp. 727, 939; Vol. CXIII., p. 939.]

The respondents commenced an action against the appellants in the County Court to recover £21 4s. in respect of water supplied to their premises in Marine Street, Bermondsey; this sum being based upon a rate of 5 per cent. per annum on £520—the rateable value of the premises. The appellants paid into Court £8 4s., the amount they admitted to be due. The County Court Judge (his Honour Judge Woodfall) decided in favour of appellants; holding that the water was supplied for the purposes of their trade or business within the meaning of section 25 of the Metropolitan Water Board (Charges) Act, 1907, and was not chargeable as a domestic supply under the provisions of sections 8 and 9 of the Act. On appeal to the Divisional Court, the learned Judges differed as to the use of the water; and the appeal of the Board was accordingly dismissed. In the Court of Appeal, however, their contention was sustained by two out of the three learned Judges who heard the arguments.

It may be remembered that when the decision of the Court of Appeal was given in favour of the Water Board, the Company wrote to the London papers stating that they were not disposed to carry the case to the House of Lords, and pointing out that the decision of the Court of Appeal entitled the Board to charge a rate for water supplied to business premises out of all proportion, in many cases, to the quantity used. They expressed their willingness to continue the fight; but they said, as the matter concerned the public more from a monetary point of view than it did themselves, they were not disposed to do so unless they were backed up by some influential body. Whether they obtained any such assistance, did not transpire; but the matter was carried to the highest tribunal.

The argument may shortly be put for each side thus: For the appellants, that the supply of water was made to trade premises, and used solely by the workpeople, for whom, under modern sanitary legislation, such conveniences had to be provided by the employer. For the Water Board, reliance was placed on the meaning of "domestic" and "trade" supply in their Charges Act. In the definition of the former, the expression "domestic supply" was to include water-closets, but not a supply for (*inter alia*) "any trade, manufacture, or business." It was argued from this that water supplied for sanitary purpose was always a "domestic" supply, and that its character was not changed merely because the closets, &c., were in a factory and not in a private house. In short, that it was the character of the use the water was put to that decided to which class the supply belonged, and not the character of the user. Further, it was argued for the Water Board that the words "trade, manufacture, or business" meant water used in a "trade, manufacture, or business"—such, for example, as a laundry.

The question had a very practical side. By section 8 of the Act of 1907, the Board are, at the request of the owner or occupier of any house or building occupied as a separate tenement within the limits of supply, to furnish a supply of water for domestic purposes at a rate depending on the rateable value of the house or building. This rate, which varies somewhat according to the value of the premises, was fixed at 5 per cent. on the rateable value as a maximum, with certain discounts.

Under section 16, if an owner or occupier shall request a supply for purposes other than domestic, the Board are to supply him by meter—such supply to be paid for at meter rates. The charge for a supply by meter for every 1000 gallons is at the following rate: Where the quarterly consumption does not exceed 50,000 gallons, 11d.; exceeding 50,000 gallons and not exceeding 100,000 gallons, 10d.; and so on. Prior to April, 1908, the Company had been supplied with water on the terms of a written agreement. This having been determined by the Board, the Company considered they were entitled to be supplied by meter. It was agreed between the parties that if the respondents' contention that the water was supplied for domestic purposes was right, the sum claimed was the correct amount due; but if, on the other hand, the appellants' contention that it was supplied for purposes other than domestic was right, the sum paid into Court was the proper amount.

Mr. C. A. RUSSELL, K.C., and Mr. M'CURDY (instructed by Messrs. H. H. Wells and Sons) appeared for the appellants; Sir ROBERT FINLAY, K.C., Mr. DANCKWERTS, K.C., and Mr. A. B. SHAW (instructed by Mr. Walter Moon, the Solicitor to the Board) represented the respondents.

Mr. RUSSELL submitted that the supply of water was not, upon the facts agreed, one for domestic purposes, but for the purposes of a trade, manufacture, or business within the meaning of the Act, and should be deemed a supply for non-domestic purposes.

Mr. M'CURDY followed on the same side.

Sir R. FINLAY, for the respondents, argued that, having regard to the use made of the water supplied to the premises in question, it was a supply for domestic purposes. Whether a supply was for domestic purposes or "for purposes other than domestic" depended upon the character of the use of the water, and not on that of the place of user; and a supply of water which would be for domestic purposes if the water were used in a dwelling-house did not change its character or cease to be a domestic supply merely because it was used in business premises.

The LORD CHANCELLOR said he understood Counsel's argument to be that a supply of water for trade purposes must be used for trade, and that a supply for domestic purposes did not come within that.

Sir R. FINLAY said that was the case in a nutshell. He submitted that the contentions of the appellants were unsound in principle, and against the express terms of the Act of Parliament.

Mr. DANCKWERTS followed on the same side.

Mr. RUSSELL having replied,

The LORD CHANCELLOR, in moving that the appeal be dismissed, said he thought the point in the case was short and simple. The question was whether, when a factory was equipped with lavatories, closets, and so forth, for the use of the men, such as masters might be required by legislation to provide, this was a supply of water for trade or for domestic purposes within the meaning of the Act. If there were no statutory definition, he would say it was a supply for domestic purposes. But there was one. It stated that certain things—viz., water-closets and baths—were included as domestic purposes; but the supply for domestic purposes was not to include a supply for trade purposes. In his opinion, the construction Sir Robert Finlay had put upon the section was accurate. He read section 25 of the Charges Act as meaning that the supply of water for closets and baths of the dimensions there mentioned was always to be treated as a supply for domestic purposes. This ended the case. Even if it were not so, he did not think the supply in question came within the words "trade, manufacture, or business." These words he took to mean "supply for use in trade, business, or manufacture." He thought the appeal failed.

Lord ATKINSON concurred.

Lord SHAW said it was quite true that there might be many cases in modern industries in which a building was occupied exclusively for the purposes of trade, and in which, under modern conditions, not a few sanitary and other conveniences for the workmen were provided. The respondents' Charges Act had not left such cases out of view. Section 9 expressly dealt with the case of a building which was exclusively occupied for the purposes of trade or business; and yet, with reference to such building, provisions were made for the "domestic" supply of water. In his opinion, the supply of water for domestic purposes was quite separate and distinct from the supply of water for use in trade or manufacture. This separation was the reason for the separation in rate; and the arrangement and conjunction of these two in fact was the reason for section 9 and for the provision there set forth.

Lord MERSEY concurred. He thought the whole matter could be put in a sentence. The real question was whether water used for the mere personal convenience of the men employed in a factory could be said to be water supplied for trade purposes. In his opinion, such a contention was not possible, as the water was not supplied for any trade purposes at all.

The appeal was accordingly dismissed, with costs.

SEQUEL TO A CHARGE OF STEALING GAS.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Nov. 13 to 15.

(*Before Mr. Justice* GRANTHAM *and a Common Jury.*)

Maas v. Gaslight and Coke Company.

In this case, the plaintiff, Mr. Charles Maas, sued defendants for damages for trespass, false imprisonment, and malicious prosecution. Defendants denied that they caused the plaintiff to be imprisoned, admitted that they prosecuted him, but denied that they did so without reasonable and probable cause.

Sir F. LOW, K.C., and Mr. P. B. MARLE appeared for the plaintiff; Mr. JOHN SANKEY, K.C., and Mr. H. W. ROWSELL represented the defendants.

Sir F. LOW said this was a claim against the Gaslight and Coke Company; plaintiff's complaint being that the Company, by their officials, caused him to be taken into custody and imprisoned for an alleged offence of stealing their gas. He was a German who had been in business in this country for some eleven years. He had a place in Pelham Street, Kensington, and there carried on a bicycle repairing and storing business. On April 16, 1910, a raid was made on his premises by some of the officials of the defendant Company, assisted by the police; and plaintiff was charged with stealing gas. It appeared that there was an old meter in the building, and there was an old tap in one part of the gas supply which could possibly be used with a piece of india-rubber pipe about 14 or 15 inches long for the purpose of conveying the gas to the building without it passing through the meter. When the raid took place, the plaintiff ran to a shelf just above the meter, where he kept his money, in order to secure it. This action was construed by the gas officials to be in relation to the meter; and their theory was that there had been an illicit connection made by the plaintiff between an old tap in the gas-pipe and the premises, which had been dealt with by the plaintiff when the raid was made. But all that could be found by the defendants was a small piece of india-rubber piping about 4 inches long, which, if put on the pipe in question, would have burst, and would certainly not reach 14 inches. When the tap with which the connection was alleged was examined, it was found to be so fixed by verdigris that it was impossible to move it. Therefore the whole theory on which the prosecution was founded was crumpled up. Plaintiff had been taken to the Police Court, remanded from time to time, and then tried at the County of London Sessions. The Jury, after hearing the case, and having been to Kensington to examine the pipes, acquitted the plaintiff. But he had been considerably injured, and his business interfered with by the prosecution; and he now asked substantial damages at the hands of the Jury.

Mr. *Charles Maas*, the plaintiff, said he had never had a connection with the defendants' gas-meter so as to be able to use gas without paying for it. When the raid was made on his premises by the officials,

he did not know who they were, and he rushed to a small shelf near the meter, where his money was kept, in order to secure it.

Mrs. *Richards*, who rented an adjacent place from the plaintiff, said she had never seen him tamper with the gas-fittings or the meter.

H. Burgess, a gas-fitter and plumber, stated that he examined the tap and the fittings of the meter three days after the raid had taken place. The tap which must have been used if plaintiff had taken an illicit supply of gas was caked with verdigris; and it was quite impossible for it to have been used for some time previously.

Mr. *Hassall* said he used to store his bicycle on plaintiff's premises; but since he heard of the charge against him, he had ceased doing so. He thought a man who would steal gas might steal his bicycle.

Mr. SANKEY, for the defence, said that to establish a case of malicious prosecution and false imprisonment, the plaintiff would have to satisfy the Jury that the Company had no reasonable and probable cause for what they did. He would show, by evidence, that they had every reason to believe that plaintiff was stealing gas. For some months prior to the raid, he was working two or three times a week until 2 o'clock in the morning; and yet his gas consumption for the quarters ending December, 1909, and March, 1910, only came to about 20s. and 22s. The Company had the right, under the Act of 1871, to go into a house and inspect the fittings; and this they had done on the occasion in question. When the raid was made, the plaintiff wished the Jury to believe that he thought the officials present were burglars, and that he went to the meter to get his money. This was a very odd story, considering that it was 9 o'clock in the evening when the raid was made; and he would ask the Jury to disbelieve it.

Inspector *Draper*, who had charge of the raid, said that when they went into plaintiff's shop he rushed to the place where the meter was, and seemed to pull something from there. There was a tearing sound; the lights went out; and there was then a strong smell of gas.

Several other witnesses were called with a view of showing that the defendants had reasonable and probable cause for what they did.

Mr. SANKEY, in summing up the defendants' case, said the Jury were not trying the question of whether or not the plaintiff had stolen gas. This was tried at the Sessions; and he was acquitted by the Jury. On the question of malicious prosecution, the point was, Did the defendants act without reasonable and probable cause? If a prosecutor relied *bonâ fide* upon the information of credible persons, and had reasonable and probable cause for so doing, he could not afterwards be called upon to pay damages. Were it otherwise, in every case of acquittal a prosecutor would be liable to an action for damages. Of course, it was very easy to be wise after the event. The evidence proved that when the police, accompanied by one of the defendants' servants, visited the premises, and said they had come to examine the meter, the plaintiff at once rushed to it, and, having pulled something away, the lights went out—the tap of the meter at the time being turned off. Dealing with the question of false imprisonment, the learned Counsel pointed out that, though a private person had no right to arrest on suspicion of felony, a constable had such a right; and here Draper, suspecting a felony had been committed, very rightly arrested the plaintiff.

Sir F. LOW, in reply, pointed out that a Company could only act through an agent; and notice of the facts to Stovell, the defendants' servant, would be notice to his principals. If it was true that the cock could not be moved, and that gas never came through it, this was not merely proof of the innocence of the plaintiff, but it was proof that the agent never saw the thing he said he did.

The Jury found for the plaintiff, and assessed the damages at £350.

His LORDSHIP entered judgment in accordance with the finding, and declined to grant a stay of execution.

The Alleged Misappropriation of Gas at Falkirk.

Sheriff-Substitute Moffat, on Thursday of last week, resumed the hearing of evidence in the complaint by the Corporation of Falkirk against Bailie Henry Russell, one of their number, to the effect that he had misappropriated gas supplied to him for power purposes for the lighting of his premises (*ante* p. 328). Henry Webster, a surveyor of meters and collector of gas accounts, stated that differential rates came into operation in October, 1906. The gas-engine rate was 5d. per 1000 cubic feet less than for lighting. Bailie Russell's account for the year from May, 1910, was £7 0s. 1d. A deduction of £1 was made by the Corporation. This had nothing to do with the lacquering plate. It was the case that prior to the survey in the beginning of 1909, when this allowance was granted, the plate was heated from the same gas-meter from which the light was taken. For the defence, Mr. James Robertson, the Borough Chamberlain of Falkirk, said there were two meters in the Burgh stables—one for supplying power to the engine, and the other to supply light. Thomas M'Kee, inspector of cleaning, said that on a pipe leading from the meter adjoining the gas-engine there were several brackets for lighting. John Andrew Sours, principal electro-plater in Mr. Russell's employment, could not imagine anyone looking at the meter in the electro-plating shop and not seeing the connection for lighting. It was ridiculous to suggest that Mr. Russell had a fraudulent design when he made the connection. It was exactly the same connection which he had had in his old shop. Bailie Russell, the accused, said when he took the light for the electro-plating room from the heating meter he did so in an obviously open manner. It was such a trifling matter that it gave him no thought at all. When the charge was brought against him in the Gas Committee, he made a calculation, and said that, at the most, on the year's working the total sum he would gain by what was complained of was 2s. 6d. He was paying the Corporation over £100 per year for gas. The evidence was concluded, and the case continued for the hearing of the parties' Agents upon the proof.

The Ryde Town Council, having permitted Mr. J. Cochrane to withdraw his tender for supplying pumping machinery, gas-producer, and other plant for the water-works, have accepted that from Messrs. Ruston, Proctor, and Co., for £6820. The withdrawal by Mr. Cochrane was in consequence of his being unable to get delivery in the prescribed time.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Late Mr. Robert Morton—His Successor on the Board.

An Extraordinary General Meeting of the Company was held yesterday at De Keyser's Hotel—Mr. CHARLES CARPENTER in the chair—for the purpose of electing a Director in place of the late Mr. Robert Morton.

The SECRETARY (Mr. F. M'Leod) having read the notice calling the meeting,

The CHAIRMAN said: This meeting has been called, in accordance with the terms of our Special Act of Parliament, for the purpose of filling the vacancy caused by the death of our lamented colleague, Mr. Robert Morton. Mr. Morton joined the Board in 1886, bringing to its deliberations a calm judgment, a sterling honesty of purpose, and a fearless belief in justice—qualities which were invaluable in his association with the late Sir George Livesey, when some three years later we had to meet a very determined attack by the would-be wreckers of our co-partnership. I need not remind the proprietors of the period of trial and trouble we went through in 1889. Mr. Morton's support of the late Sir George Livesey was, I know, inestimable through that time of stress. I can truthfully say the loss the Company sustained by the decease of Mr. Morton is second only to that occasioned by the death of Sir George himself. Mr. Morton's judgment was always sound, his technical advice was invaluable, and he leaves a void in our counsels, as in our hearts, which will be difficult, if not impossible, to fill. The Board have given a great deal of consideration to the question of his successor, and ultimately decided to support the candidature of Mr. Laurence Rostron. The son of a gentleman for many years a respected member of the Board, Mr. Rostron has had exceptional opportunities for becoming familiar with its policy and working, especially from the legislative and legal points of view; and I know he has taken full advantage of them. He is an ardent believer in co-partnership in general, and ours in particular. On many occasions since the year 1900, he had from Sir George Livesey's own lips very clear and emphatic enunciations of the principles of the policy Sir George adopted, and which underlay the many innovations he made in the management of this Company. I think I need only further add that Mr. Rostron is in his fortieth year; he is a member of the London County Council; and he is full of energy and enthusiasm for the work the Company has done in the past, and which it will have to do in the future, if it is to maintain its high traditions. I have great pleasure in moving—"That Mr. Laurence W. S. Rostron be elected a Director of the Company in the place of Mr. Robert Morton, deceased."

The DEPUTY-CHAIRMAN (Mr. Frank Bush), in seconding the resolution, desired to associate himself with all that had fallen from the Chairman concerning their friend and colleague, the late Mr. Robert Morton. Mr. Morton was a high-minded, honourable gentleman. He took a deep and practical interest in all that concerned the welfare of the Company; and he (Mr. Bush) thought they were indeed fortunate to have him on the Board, with his ripe experience, for twenty-five years. He was sure they all deeply mourned his loss. Coming now to the proposition before the meeting, the Chairman had exhaustively dealt with Mr. Rostron's merits; and he (Mr. Bush) only desired to say this, that he had known the gentleman for several years, and firmly believed that he would be a loyal colleague. He also believed that he would prove to be a very useful Director. He had therefore great pleasure in seconding the resolution.

On being put to the vote, the resolution was heartily carried, with cries of "All."

The CHAIRMAN having thanked the proprietors for their unanimous decision,

Mr. ROSTRON said he thanked his fellow-proprietors most sincerely for the great honour they had done him in electing him to fill the vacancy on the Board of this important and truly progressive Company. He had known, and been interested in, the South Metropolitan Company ever since his father first took him to the works, when he (the speaker) was quite a small boy, and Sir George Livesey showed him over them. He did most earnestly appreciate the honour done him in electing him a Director. When his father was a member of the Board, the Company was of the greatest interest and pleasure to him, and anything he could do for it was a labour of love, as he (Mr. Rostron) could assure his fellow-proprietors it would now and in the future be to him. He also thanked both the Chairman and the Deputy-Chairman for the kind words they had employed.

SALFORD AND LIMITATION OF PROFITS.

The efforts made by the Salford Gas Committee to placate the members of the authorities within the area of their supply, with a view to avoiding opposition to the next Bill to be promoted by the Corporation, have evidently failed, writes our Manchester Correspondent. At a meeting of the Swinton and Pendlebury District Council on Monday of last week, Mr. W. P. Kidd, the Chairman, stated that a Bill was to be promoted jointly by the Eccles Corporation, the Swinton and Pendlebury District Council, and the Worsley District Council, with the object of compelling the Salford Corporation to give effect to the decision of the House of Lords Committee in 1909, when the latter authority sought powers to reduce the illuminating power of the gas from 18 to 14 candles, and to purchase additional land for gas-works purposes. A similar announcement was made by the Mayor at a meeting of the Eccles Town Council; and on Wednesday last, a special meeting of the Salford Town Council was held to consider a resolution of the Gas Committee recommending the Council to give notice of their intention to promote a Bill in Parliament in the ensuing session for gas-works purposes.

It will be remembered that the House of Lords Committee, presided

over by Lord Donoughmore, after taking evidence at great length from the four Local Authorities opposing the Corporation Bill, announced that they were prepared to agree to the measure under certain conditions, which, in effect, aimed at the limitation of the profits to be made on the Salford gas undertaking and a consequent reduction in the amount to be handed over in relief of the rates from the department, together with a re-arrangement of the differential charge made to gas consumers in the districts supplied by the Corporation. Counsel for the opposing Authorities sought to have the differential charge abolished altogether. The Salford Corporation withdrew the Bill; Alderman Phillips, the Chairman of the Gas Committee, pointing out that if the decision of Lord Donoughmore's Committee were to be accepted, it would practically take away the power of the Corporation to make a profit out of the gas undertaking, which would place the ratepayers of the borough in a serious position.

The Chairman of the Swinton and Pendlebury District Council, in the course of an interview, indicated that the opposing Authorities were acting on the advice of eminent Counsel in promoting a Bill jointly, and said, if successful, it would mean a great saving to the gas consumers in the out-districts. There will be clauses in the measure not only limiting the profit to be made on the Corporation gas undertaking, but bringing the charges for gas to the consumers outside the Salford area down to the same level as those obtaining within the borough.

Alderman Linsley, the Mayor, presided at last Wednesday's special meeting of the Salford Town Council. He said the matter they were met to consider was very important—so important that, in his opinion, it would be better to form themselves into a General Purposes Committee.

Several members protested against this procedure; but the resolution was carried without anyone voting against it. The Council sat as a General Purposes Committee for considerably over two hours; and when the representatives of the Press were re-admitted, Alderman Phillips moved the adoption of a resolution to the effect that the recommendation of the Gas Committee for the promotion of a Bill be approved, and that the Parliamentary Public Trust Committee be authorized to settle the terms of the notice for the Bill. This resolution was seconded by Mr. Burnley, the Deputy-Chairman of the Gas Committee. It was urged by Mr. Brotherton that everything possible should be done in the way of conciliation, before the Council resolved to spend a large sum on the promotion of a Bill. He believed that even now an amicable arrangement could be made with the outside Authorities, and suggested the appointment of a Consultative Committee to deal with the subject.

When the resolution was put, there was no opposition; and the Mayor declared that it had been carried unanimously.

Members of the Salford Corporation Gas Committee complain that the authorities within their area of supply have adopted an unreasonable attitude; and they assert that unless their demands are modified, there will be a big fight when the respective Bills come before Parliament. Mr. Brotherton, who is in favour of conciliation, still believes that an arrangement could be made with the opposing authorities. He says he has been making inquiries, and the result shows that Salford could get 2¼ per cent. instead of the 1 per cent. given by Lord Donoughmore's Committee. He argues that if this could be embodied in an agreement, it would be to the advantage of Salford.

WOMBWELL GAS AND WATER SUPPLY.

We have received the report of the Gas and Water Manager of the Wombwell Urban District Council (Mr. P. Dawson Walmsley, B.Sc.) for the year ended the 31st of March last. It shows that the gross profit was £3537, compared with £2835 for the year 1909-10; and the net profit £2672, against £1279. The net profit has been allocated as follows: New coal-handling plant, coal-store, tar-extractor, &c., paid for out of revenue, but properly capital charges, £1109; to the general district rate, £1563. The quantity of coal carbonized was 5233 tons; and the make of gas was 61,871,000 cubic feet, or at the rate of 11,823 cubic feet per ton. The increase in the total production was 3,337,000 cubic feet, in the make per ton 163 cubic feet, and in the quantity sold 3,674,320 cubic feet. The unaccounted-for gas was reduced 1·6 per cent. Full particulars are furnished of the new work carried out during the year; and an indication is given as to the nature of future requirements, including additional storage. In connection with distribution, several improvements were effected last year. The gross profit in the Water Department was £607, and the net profit £359; the figures for the preceding year being £130 and £71. The satisfactory rise in the net profit was brought about partly by greater revenue due to increased sales, and partly by a reduction in the amount paid for water and working expenses. The waste-detecting system introduced two years ago, on the recommendation of Mr. Walmsley and the Chairman of the Council, has given satisfactory results. There was a reduction of £131 in the amount paid for water in the past two years, notwithstanding an increase in the number of supplies and a constant service being afforded in all parts of the Council's district of supply.

The half-yearly meeting of the Labour Co-Partnership Association will be held at Oxford next Saturday. A paper will be read by Mr. Aneurin Williams on "Labour Unrest and Labour Co-Partnership." The co-partnership principle is being adopted increasingly in ordinary commercial undertakings; but the greatest growth has been in the gas industry, where the example set by the late Sir George Livesey in the case of the South Metropolitan Company has been followed by 32 other companies; and the total capital of these undertakings amounts to about £48,000,000.

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MANNHEIM GAS UNDERTAKING.

Report for the Year 1910.

The report of the Corporation gas undertaking of Mannheim for the year 1910 states that a scheme for the extension of one of the two gas-works belonging to the Corporation—viz., that at Luzenberg—which had been prepared by the Manager of the works, Herr Pichler, was submitted to Herr Prenger, the Manager of the Cologne gas undertaking, and, having been approved by him, was adopted by the Gas Committee on April 26 last. The estimated cost of the extensions is about £155,000, which sum was voted by the Town Council, and the new buildings, &c., were started on the 16th of June. The quantity of gas sold during last year was 14,108,968 cubic metres (about 498,272,300 cubic feet), which is an increase of 3·96 per cent. on the output in 1909. There has, however, been a reduction in the consumption by the Municipality and State; and the sales to private consumers actually show an increase of 5·85 per cent. The make of gas per ton of coal (mostly Westphalian) carbonized was 10,844 cubic feet. The average net calorific power of the gas was 544 B.Th.U. per cubic foot. The public lamps in one suburb are lighted and extinguished by a system of electric distance-lighters; but as experiments which have been going on for some years past with pressure-wave ignition have had a satisfactory result, it is intended to extend this system. The year's working realized a gross profit of 1,018,040 marks (£50,902), which, after deduction of interest and depreciation charges, left 452,010 marks (£22,600 10s.) to be transferred to the municipal chest.

PROGRESS OF THE GAS INDUSTRY IN JAPAN.

In previous issues of the "JOURNAL," reference has been made to the monthly magazine, bearing the title of "The Gas Kai," devoted to the gas industry in Japan. The first pages of the October number are in English—the opening article being on the subject of "The Gas Industry in Japan;" and we take from it the following particulars.

During the past few years, the development of the gas and electric industries has been remarkable. Even in a small remote town, the population of which is but a few thousand, gas is used for heating as well as illuminating purposes. About forty years ago, a Gas Company was started in Yokohama, and then one in Tokyo. More than thirty years elapsed without much attention being given to the gas industry until a few years ago. Now, however, there are more than sixty companies engaged in the business, to say nothing of the hundred or more now applying for licences for organization. In 1893, gas companies were started in Osaka and Kobe; and in 1903 in Nagoya. Before many years have passed, it is expected that more than 200 companies will be engaged in the gas business throughout Japan. The existing gas companies are, without exception, doing well—paying 10 to 15 per cent. dividends.

The majority of the meters used are dry; but wet ones are employed by the Tokyo Gas Company to a small extent. That Company, Kimmon Shokai, and the Shinagawa Meter Company are the only meter manufacturers in Japan; and their output is hardly sufficient to meet the demand from the various gas companies. Among foreign-made meters, those of such manufacturers as Thomas Glover, Parkinson, and Braddock, are used. Inverted burners have become so popular that the upright ones have almost ceased to exist. The latter are being rapidly replaced by the former. The "Diamond" burner, made by the Tokyo Gas Company, and the "Sampei" burner, made by the Company of that name in Osaka, are stated to be noted for their excellent workmanship among the home-made burners. It appears that there is great need for a suitable inverted "arc" burner; and well-made burners of from 200 to 300 candle power will find a good market in Japan. Most of the mantles used are produced at home; the import duty of 6 sen each preventing foreign mantles from having a large sale. Home-made pendants and brackets are mostly used for ordinary purposes; where, however, decoration and artistic beauty are required, foreign-made goods are installed.

The demand for stoves is stated to have been "tremendous" during recent years. They are almost wholly imported, except those made by the Tokyo Gas Company. It is stated that foreign-made stoves are much needed in Japan; and it is suggested that the following points might be kept in view by makers: "(1) That the stoves should harmonize with the Japanese room, and be acceptable to Japanese taste. (2) That they should not be too large, as the Japanese room, where they are installed, is generally of 144 to 288 feet. (3) In Japan, stoves are rather regarded as ornamentation, and the people would like to sit around them, and also warm themselves. (4) Japanese are accustomed to stretch out their hands over the fire in the fire box, and therefore such stoves as radiating stoves, which keep the fire from sight, are not acceptable to them."

HASTINGS ELECTRICITY UNDERTAKING.

Last Tuesday a Local Government Board inquiry was held by Mr. H. R. Hooper at Hastings, with reference to an application by the Corporation to borrow £621 for an extension of the electric light mains in the West Hill district. The Town Clerk (Mr. B. F. Meadows) said investigation showed the scheme would be a profitable one. The supply of current which had already been asked for would bring them in a revenue of £50 a year; and, in addition, they would be able to convert sixteen street gas-lamps now costing £3 2s. 2d. each. The income of £50 for private lighting would only entail a cost of £8 (the only extra outlay required being for fuel); so that it would be profitable. With regard to the lamps, the charge made to the Public

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Lighting Committee would be £3 5s. 8d. each; but the actual cost would be only £1 14s. 3d. Thus there would be a profit of £24 a year on the sixteen lamps. Mr. C. E. Botley, who opposed the application in his capacity as a ratepayer, pointed out that there was a loss on the working of the undertaking, and objected to the increased cost of fuel being taken as the only charge entailed in supplying the contemplated new consumers. He also drew attention to the fact that the charge per lamp for electricity was 3s. 6d. more than had to be paid for gas lighting. The cost of lighting the public lamps by electricity was, he added, taken from one pocket of the Corporation and put into the other. The alleged profit only existed on paper. In fact, the undertaking was being carried on in a reckless manner. Mr. C. F. Botley said it was simply juggling with the accounts to charge, as they did, 2d. per unit for certain lamps and 4d. for public arc lamps. Mr. Martin also said there was a loss on the undertaking; and he objected to paying for light he did not use. There was a greater charge for electricity than when gas was employed. The Town Clerk remarked that if the Corporation were not allowed to borrow money for extending the mains, they could not expect to get an increase of consumers; and it was only by adding to the customers that they could make the Electricity Department a profitable concern.

FUTURE ELECTRICITY SUPPLY OF LONDON.

Proposed Linking-Up of the Undertakings.

At the Meeting of the London County Council last Tuesday, a long report presented by the Finance Committee on the 7th inst., dealing with the financial relations between the Council and the Local Authorities of London in the matter of loans generally, and particularly with those sanctioned for the supply of electricity, was under consideration. In the second section of the report, the Committee discussed the question with special regard to the position created by the London Electric Supply Act of 1908; and the views expressed therein have an important bearing on the future supply of electricity in London.

The London Electric Supply Act, which became law in December, 1908, empowers authorized undertakers—*i.e.*, London Electric Supply Companies and Local Authorities, as defined by the Electric Lighting Act, 1882, for the time being authorized to supply electrical energy—within the Administrative County of London to enter into agreements for mutual assistance or for association with each other in regard to the following purposes: (1) The giving and taking of a supply of electrical energy and the distribution and supply of electrical energy so taken. (2) The management and working of the generating stations or of any part or parts of the several undertakings of the contracting parties. (3) The appropriation and division of receipts arising under and the provision of capital required for carrying into effect any such agreements. (4) Any matters or things incidental to, or connected with, these purposes. The Act also transfers to the Council the powers of purchase previously vested in the several Borough Councils, so far as regards the undertakings of most of the London Electricity Supply Companies, and in addition empowers the Council to purchase the undertakings (or parts of them in the county) of those bulk supply companies which were not purchasable by a local authority. The powers of purchase may be exercised in 1931, or at subsequent periods of ten years.

We had the provisions of the Act under consideration in October, 1909. It appeared to us that the possibility of agreements being entered into under the Act between local authorities or local authorities and companies was a matter which should be borne in mind in the consideration of applications for loans for generating plant, in order that unnecessary expenditure might be avoided and the requisite current obtained in the most economical manner. Since that date, when considering applications for loans for electricity generating plant, we have given special attention to the possible results of the section in the Act enabling borough councils and companies to enter into mutual agreements in regard to the supply of electrical energy. At the same time we approached the Highways Committee with a view to their consideration of the desirableness of the Council formulating, so far as circumstances would permit, a comprehensive policy in regard to the London Electric Supply Act, 1908.

Since October, 1909, there have been only a few applications for sanction to loans for electricity purposes in which the question of bulk supply could have arisen. Certain extensions have, however, been necessary in order to enable Borough Councils to comply with statutory requirements in regard to the supply of electricity. In all cases we have been kept fully informed as to the bearing of the future development of electricity supply rendered possible by the Act of 1908 in dealing with recent applications for loans. Statements submitted by us show the amount of capital expenditure, under various heads, incurred by Metropolitan Borough Councils in respect of their electricity undertakings at March 31, 1909 (this being the nearest convenient date to the passing of the Act of 1908), and the loans sanctioned by the Council since that date. The amount of loans sanctioned is £160,201 for generation and £272,793 for distribution—total, £432,994. During the period covered by these loans, the general employment of metallic filament lamps has had the effect of reducing the amount of electricity consumed, and this has arrested the extension of electricity plant in some cases.

The Council has not up to the present expressed itself in favour of any definite policy to govern its action as the sanctioning authority for loans for electricity purposes, having regard to the future development of electricity supply in London, and the possibility of the Council becoming the principal authority for the supply of electricity in or after 1931. It appears to us desirable that the Council should lay down some policy; and from one point of view the present time would seem not inappropriate for such action, inasmuch as there remain just twenty

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years between now and the earliest date by which the Council could purchase the Companies' undertakings, and this period corresponds with the loan term allowed for generating plant.

Taking a broad view of the present situation, and having regard to the developments of electricity supply in recent years, it would seem to be preferable, so far as the financial aspect of the question is concerned, for borough councils, where possible, as opportunity offered, to link-up their undertakings for mutual support as well as for economy, instead of extending a number of comparatively small, and in some cases unprofitable, concerns which may, on economical grounds, some day have to be scrapped, The Council has always considered itself entitled to all informntion affecting the financial aspect of loan applications, and if it was satisfied in any particular case that it would be more advantageous for a borough council to take a supply in bulk than to carry out any contemplated extension, it would no doubt suggest this course to them; but if there ensued a conflict of opinion on the matter, the Council would probably require very strong reasons before it would attempt to force its view upon the local authority. If the Council wished to go further than hitherto, and to act upon some comprehensive scheme with a view to stopping extensions of some undertakings and permitting extensions of others (regarding the requirements of London as a whole more particularly than is done at present), it might be necessary for the Council to be armed with further parliamentary powers of oversight and control.

In any event, it is clear that, while under existing conditions the Council might be able to give effect, to a limited extent, to any policy it might adopt as regards the undertakings of Metropolitan Borough Councils, it would have no such power as regards the other undertakings. These considerations appear to point to the desirableness of an attempt being made to secure some agreement as to the future lines of development on the part of all electricity supply authorities in London, including Companies and Metropolitan Borough Councils.

The report having been received,

Sir John Benn, after attacking the method of government in London, and especially the Borough Councils and the division of London into separate governing areas, said the supply of electricity ought never to have been entrusted to the boroughs and to separate Companies. In London, taking the Companies and the Borough Councils together, it was necessary to provide some 212 million units of electricity per annum to meet the requirements of consumers. At the generating station at Greenwich, the Council produced 110 million units at 0·25d., or ¼d. per unit. If they added to this the cost of distribution on the basis of the average for the Borough Councils in 1909—0·35d.—they arrived at 0·60d. as the total cost at which the Council could supply. This was the Council's cost of production and the Borough Councils' cost of distribution. But the total average cost of electricity in London was 1·02d. per unit, or 0·60d. more than the cost at which the Council could supply if the borough undertakings were linked-up with Greenwich. On this basis, the consumers of electricity in London were paying £530,000 a year more that they would do if current were generated and distributed on the same scale as that of the Council's own system for tramways.

The Right Hon. Hayes Fisher, M.P., said the Council would in twenty years' time have the purchasing of the electricity undertakings, and they had to look ahead and try to get into agreement with the Companies. This was quite possible and very desirable. He thought they should appoint a strong composite Committee of both sides to make a searching inquiry into the subject of London's electricity supply—a Committee which might be able to take expert advice, and formulate some kind of rough proposals for dealing with the whole question of the undertakings purchasable in twenty years' time.

The further consideration of the report was adjourned.

ACQUISITION OF WATER BY LOCAL AUTHORITIES.

It may be remembered that a Bill has been introduced into the House of Commons by Mr. Herbert Lewis, supported by the President of the Local Government Board, to empower the Board, by Provisional Order, to authorize the council of any county borough or borough or any urban or rural district council, for the purpose of the acquisition of water, to abstract water from any river, stream, or lake, notwithstanding anything contained in sections 327 and 332 of the Public Health Act, 1875. These sections provide (*inter alia*) that nothing in the Act empowering local authorities to supply their districts with water shall authorize them to interfere with any watercourse so as to affect the supply, quality, or fall of water to any river, reservoir, &c., without the consent of any persons who may be entitled by law to use such river, canal, watercourse, &c.; or to be relieved from any such interference. The Act does not empower a local authority to take water from streams for the purpose of their water undertaking; and to obtain this power they have to promote a Private Bill in Parliament. The object of the Bill now under consideration is to simplify this process. It was not anticipated that it would make any progress in the present session; but an announcement has been made that the Government intend to press it forward.

The foregoing facts were brought before the London County Council by the Parliamentary Committee in a report presented at the meeting last Tuesday. It was mentioned therein that the Conservators of the Thames and Lea and the Metropolitan Water Board had had a conference with the Local Government Board, with the object of securing the exemption of the Thames and Lea from the operation of the Bill; it being apprehended that grave danger to the water supply and public health of London might arise from the depletion of the water of these rivers. The Committee pointed out that this subject had engaged the attention of the Council on several occasions, and therefore they had authorized their Chairman to support at the conference the views of the three bodies mentioned. They asked for the formal approval by the Council of their action in the matter; and this was given.

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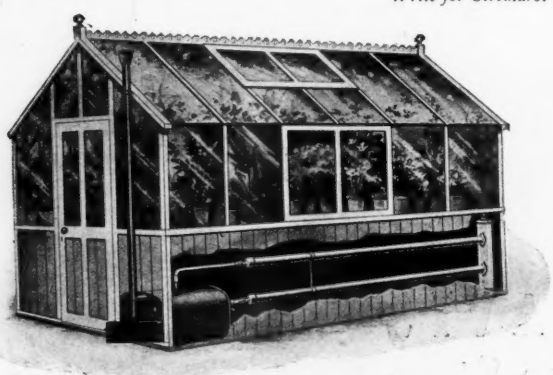

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Dumfries Town Council met on the 10th inst., and, among other appointments, they unanimously elected Mr. James S. Thomson to the office of Provost for three years. Mr. Thomson is a native of Cupar-Fife, but has lived in Dumfries for forty-five years. He has been a member of the Town Council since 1908, and has held the offices of Magistrate, Police Judge, and Convener of the Gas Committee. In recommending him, Bailie Smart stated that when Mr. Thomson entered the Council the price of gas was 3s. 6d. per 1000 cubic feet; now it was about 2s. 6d. To his labours and to the assiduity with which he worked at the gas-works they owed a great deal of their success there.

On Monday last, the Town Council of Brechin resumed consideration of the proposed gas transfer. They have already adopted the Gas Act of 1876; and this week the question was whether they should confirm the resolution. It was unanimously agreed to defer confirmation for three months, in order to give the Committee an opportunity of ascertaining whether the Company were prepared to sell.

On the evening of Tuesday last, Alexander Scott (21) was in the stable and harness-room behind the bank house in Bothwell occupied by Mr. W. M'Nab, Bank Agent, when an explosion of acetylene gas took place. He had in the house with him two companions, who explained afterwards that, the gas supply having failed, Scott went to have a look at the plant. A violent explosion occurred; and the supposition is that Scott had been leaning across the acetylene tank at the moment of the explosion, and that the force had been such that it blew off the cover, which struck Scott on the head and caused dislocation of the neck.

The Corporation of Dunfermline have for a number of years had the benefit of the services of Mr. T. Stewart as Convener of the Gas Committee. This year an attempt was made to transfer him to the convenership of the Public Health Committee. When the proposal was laid before the Town Council, Mr. Stewart said he could not conceive any reasonable excuse why he should be asked to remove. There were such enormous possibilities in connection with the Gas Department that he thought the policy which had been pursued for some time ought to be given another lease of life. The possibilities, for example, of a decrease in the price of gas were certain if things were done as he hoped they would be. There would also require to be immediate consideration of the bench of retorts. Eventually, another Convener was found for the Public Health Committee, and Mr. Stewart was re-appointed Convener of the Gas Committee.

The Hamilton Town Council have appointed Bailie Moffat Convener of the Corporation Gas Committee in room of Bailie Anderson.

The Glasgow Smoke Abatement Committee met yesterday in the City Chambers. It was reported that the exhibition held last year had proved in every respect satisfactory; and the Committee decided to organize a similar exhibition, which will be held in the autumn of 1912—most probably in another district of the city. Mr. James M. Freer was appointed Manager of the exhibition.

Various local authorities whose areas are supplied with water by the Glasgow Corporation have now definitely decided to promote a Bill in Parliament for the purpose of obtaining a reduction in the water-rate, which is 10d. in the pound, as compared with 4d. in the city. The Water Committee of the Corporation were approached on the subject two years ago; and in the course of time they replied that they could not recommend the Corporation to make any alteration in the matter. A Bill intended to give effect to the proposals of the local authorities has been drafted.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 556.]

LIVERPOOL, *Nov.* 18.

Sulphate of Ammonia.

There has been an element of depression in the situation throughout the past week, owing to the fact of the poorer demand now experienced being hardly sufficient to absorb the increasing production at the level of prices recently current. The market closes, however, slightly above the lowest point touched, and the nearest values to-day are: £14 2s. 6d. per ton f.o.b. Hull, £14 3s. 9d. per ton f.o.b. Liverpool, and £14 6s. 3d. per ton f.o.b. Leith. Little activity has prevailed for future delivery, consumers not showing much disposition to operate further. Makers are still asking a premium on spot figures; but it is reported that some of the dealers are more moderate in their views, and are offering to sell over the spring months at present prices.

Nitrate of Soda.

There is no change to record in either tone or value of this article, and the quotations for early delivery remain 10s. 1½d. per cwt. for ordinary and 10s. 4½d. for refined quality.

LONDON, *Nov.* 20.

Tar Products.

The markets for tar products remain very firm. In pitch, there has been a fair amount of inquiry during the past week; but owing to the high prices now being asked, buyers are still holding off. Benzols are still strong for prompt delivery; but business for forward is difficult to negotiate. Solvent naphthas are steady, and show signs of improvement. Heavy naphtha is in good demand. Creosote continues very firm; and the inquiry is good for both prompt and forward delivery. Crude carbolic is unchanged.

The average values during the week were: Tar, 22s. to 26s. *ex* works.

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Pitch, London, 40s. 6d. to 41s.; east coast, 40s. to 40s. 6d.; west coast, Clyde 39s. to 39s. 6d., Manchester 38s. 6d. to 39s., Liverpool 39s. to 39s. 6d. Benzol, 90 per cent., naked, London 9¼d. to 10d. f.o.b.; North, 9¼d. to 9½d. f.o.b.; 50-90 per cent., naked, London, 8d. to 8¼d.; North, 8d. to 8¼d. f.o.b. Toluol, naked, London, 9d. to 9½d.; North, 8¼d. Crude naphtha, in bulk, London, 4¼d. to 4⅜d.; North, 3⅜d. to 4d. Solvent naphtha, naked, London, 9⅜d. to 10d. f.o.b.; North, 9d. to 9½d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s., f.o.b.; North, 10d. to 10¼d. f.o.b. Creosote, in bulk, London, 2⅛d. to 3d.; North, 2⅜d. to 2½d., salty; 2⅜d. to 2¾d., liquid. Heavy oils, in bulk, 3d. to 3¼d. Carbolic acid, casks included, 60 per cent., west coast, 2s. to 2s. 2d.; east coast, 2s. 1d. to 2s. 3d. Naphthalene, £4 10s. to £10; salts, 45s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market for this article continues steady; but there has been no increase in the demand. Prices on the whole remain about the same. Actual Beckton is still quoted at £13 17s. 6d. Outside London makes are £13 10s.; Leith, £14 7s. 6d.; Liverpool, £14 5s. to £14 6s. 3d.; Hull, £14 3s. 9d.; Middlesbrough, £14 3s. 9d.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a strong demand generally in the coal trade of the North; and with a fuller supply of steamers the request for shipment is heavier. In the steam coal trade, best Northumbrians are from 11s. 6d. to 11s. 9d. per ton f.o.b.; and they are somewhat scarce for the rest of this month. Second-class steams are 9s. 6d. to 10s. 6d. per ton; and steam smalls are steady at about 5s. to 6s. The output is now normal in amount; and it appears to be well taken up generally, In the gas coal trade, the consumptive demand is now growing rapidly, and it should in the course of a week or two reach its fullest point for the season. Durham gas coals are quoted from 11s. 6d. to 11s. 7½d. per ton f.o.b.; second-class gas coals are from 10s. 3d. to 10s. 6d.; and "Wear specials" from 11s. 9d. to 12s. per ton. Slightly more than these prices are quoted for delivery in the first half of December. There are a few cargoes in treaty for export; but there are very few contracts now in the market. The high rates of freight to some of the Italian ports are hindering the usual sales to these generally good customers for gas coals at this season of the year. Coke is firmer. Gas coke retains its price, despite the enlarged output. Good makes sell at 14s. 3d. to 15s. per ton. f.o.b.

Scotch Coal Trade.

Trade continues very active and strong. All classes for shipment are in demand, and prices are firmer. For small sorts, increased prices are readily obtainable for prompt delivery. Prices now quoted are: Ell, 10s. 9d. to 12s. 9d. per ton f.o.b. Glasgow; splint, 11s. 6d. to 11s. 9d.; steam, 10s. 3d. to 10s. 6d. The shipments for the week amounted to 295,058 tons—a decrease upon the preceding week of 43,692 tons, but an increase upon the corresponding week of 7182 tons. For the year to date, the total shipments have been 14,313,231 tons—an increase of 268,195 tons upon the corresponding period.

Oriental Gas Company, Limited.

In the report which the Directors of this Company will present at the meeting of shareholders to-morrow week, they state that the gas-rental for the year ended the 30th of June shows an increase of £2372 on the corresponding figures for the previous year. Of this, a large proportion was derived from private consumers—a gratifying sequel to the reduction in the price of gas made last year. There was a satisfactory market for residual products; and they yielded an increase of £2220. The report proceeds as follows: "The operations of the twelve months under review have been fully as extensive as was foreshadowed to the proprietors a year ago. Having regard to their probable magnitude, so far as they could then be foreseen, the Directors, towards the close of 1910, despatched to Calcutta Mr. Jacques Abady—an acknowledged authority on public lighting—charged with a mission to confer with the Corporation of Calcutta in regard to matters connected with the Company's new contract with the Municipality. He was further instructed to inspect and report to the Directors upon the Company's undertaking generally, having regard to its obligations under the new contract, and the prospective increased demand which might be made upon its resources by the necessities of the general public for power and other purposes in addition to illumination. Extensive additions and modifications have been made to the Company's buildings and plant; and these, coupled with the expenditure already sanctioned in order to complete the operations which last year were reported to be in progress, have entailed a considerable, but economically sound, expenditure of money. To meet this outlay, an appropriation of £26,000 has been made from the contingency and reserve funds, which accumulations were formed for such a purpose. Work yet remains to be done—notably that in connection with the regenerative retorts and the retort-charging machinery, which are far advanced, but not yet completed. The proprietors will remember that the new twenty-years contract above mentioned was to come into operation on the 1st of May, 1911. Under the terms of the contract, it was provided that the Company shall supply the gas to the Corporation, and the Corporation shall themselves assume the responsible charge of the lighting, extinguishing, and maintenance of the public lamps. As the date approached, it became apparent to the Corporation that they were not sufficiently advanced in their preparations for the establishment of a Department of Public Lighting, and they accordingly opened with the Company negotiations having for their object the postponement of the date of commencement of the new contract. Recognizing the position, the Directors agreed to a postponement until the 1st of March, 1912—the date desired by the Corporation."

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LEST YE FORGET.

New Water-Works for Seville.

The whole question of a filtered river-water scheme for Seville has been settled. The project is about to be carried out; but, under the terms of an agreement with the authorities, a dual system of mains is to be laid in order that the spring water may be retained for drinking, cooking, and personal use. It practically means that a new water-works for Seville will have to be constructed; but the advantages to the Company and the citizens are great. The Company will receive additional revenue from increased rates and from the authorities for public water supply; and this additional income, with the increased business the Company will be able to take on, will make the scheme a financially good one. Seville has long wanted additional water; but the authorities could not be persuaded until now to admit even filtered river water. But lately there has been a change of view; and all the authorities concerned have worked earnestly with the Company with the idea of coming to a settlement of the vexed question. In the result, Seville is assured of a constant and bountiful supply of water. At a meeting of the Company's shareholders last Friday, after explanations by the Chairman (Mr. Cowley Lambert) and Mr. Easton Devonshire, the Directors were unanimously authorized to issue 7500 £20 preference shares, carrying the right to a fixed cumulative preferential dividend of 6 per cent. The money is to be spent on the filtered river-water works, and will be raised as needed.

Woolcombers and Gas Workers.—It is reported that a scheme which will tend to regularize the employment of woolcombers and gas workers in Bradford has been entered into by the Bradford and District Machine Woolcombers' Association and the Gas Workers and General Labourers' Union. In summer, employment at the gas-works is slack; and the woolcombing industry suffers similarly in winter. Hitherto only members of the respective trade unions were allowed to work at the respective trades; and the new arrangement is to "recognize" each other's members, so that gas workers may obtain employment as woolcombers in summer and the woolcombers as gas workers in winter, in order to reduce unemployment in both trades.

Dangers of Electrical Bed-Warmers.—A correspondent of "The Times" has addressed a word of warning to the many elderly people and invalids who are being fascinated by the supposed handy and practical advantages of electric bed-warmers—*i.e.*, the substitute for the hot-water bottle—which are intended to retain heat as long as they are attached to the local electric supply service. These electric bed-warmers are (it is stated) extremely dangerous, as they easily ignite when kept under cover in such a manner as not freely to radiate heat—that is to say, if kept tightly covered under bed-clothes or the like. In one case, after use for about three hours on the 240-volt circuit of one of the London electricity supply companies, the bed-warmer ignited the bed-clothes, and it was entirely a matter of chance that the user escaped with her life owing to the heat created by the smouldering bed-clothes waking her before asphyxiation.

Increased Wages for Hull Gas Workers.

Last Thursday, a notice was posted up at the Hull works of the British Gaslight Company stating that Mr. John Young, the Engineer, would be pleased to meet the men at a smoking concert in the new dining-hall on the following evening. A very large audience turned up, and found a pleasant surprise awaited them. Mr. Young, during an interval in the concert, said that some time ago his wife reminded him that the necessaries of life were getting dearer; and this started him thinking. Having devised a scheme in his own mind, he saw the Directors—and it was unnecessary for him to remind the old hands what a fine lot of gentlemen they were. As the outcome, the Board had decided that every foreman and workman at the station should have 1s. per week added to his wages. In talking the matter over, it was seen that the men who suffered most from the increased cost of living were those who were receiving the least money; and so it was determined that those who were getting 25s. per week and downwards should have an extra 1s. added to the general advance of 1s. Mr. Young announced further that the Company had decided to present medals to those men who had been in their employ 25 years, and that the design was now being prepared. It is stated that more than 50 will be eligible to receive the medal. Mr. Young's news was received with great enthusiasm.

Carlisle Rural Water Scheme.—The Carlisle Rural District Council have adopted a resolution of the Water Committee approving of a comprehensive water scheme for their area, and requesting Mr. Joseph Graham to prepare plans and details for submission to the Local Government Board. The estimated cost of the scheme (including the value of existing mains laid by the Corporation in the rural district, which will be taken over) is £57,500.

Stimulating Effect of the Compensation Act.—In opening an inquest at Wrexham on the body of a man named Anderson, the East Denbighshire Coroner (Mr. L. Kenrick) said it was alleged that deceased met with an accident about four years ago. It appeared that he was a stoker in the employ of the Wrexham Gas Company, and during the dinner hour was walking through a retort-house which was being erected, when half a brick fell from the scaffolding and struck him on the head, inflicting serious injuries, which caused him to absent himself for eleven days. "It was wonderful," said the Coronor, "what a stimulating effect upon the memory the Workmen's Compensation Act seemed to have. If a man scratched his finger in the course of his employment some years previously, it seemed to be connected with the death of that person afterwards, however slight the injury might have been at the time." Mr. Owen Evans, Assistant Gas Manager, stated that he remembered the accident, which was entered in the book kept for the purpose as "slight injury to head." Dr. Russell said the cause of death was meningitis supervening on the accident; and the Jury returned a verdict in accordance with this evidence.

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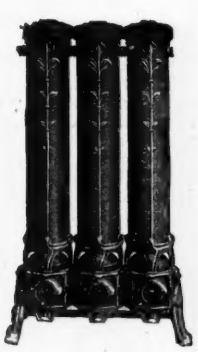

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Portsmouth Water Company.—At the half-yearly meeting of this Company on Thursday, the Directors will report that the available balance on the profit and loss account is £28,523, out of which they will recommend the payment of the full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £8429. The Directors recommend that of the latter amount a sum of £500 shall be carried to the arrears of dividend fund, and £1000 allocated to the contingency fund. A balance of £6929 will remain; and the Directors recommend that it shall be carried forward.

Bermondsey Electric Light Loan Refused.—At the meeting of the London County Council last Tuesday, the Finance Committee recommended that the application of the Bermondsey Borough Council for sanction to the borrowing of £18,563 in connection with their electricity undertaking be not granted, on the ground that all the information necessary to enable the Council to consider the matter in its financial bearings had not been supplied. Application was made to the Borough Council for information as to the terms offered to them by two local Companies for the supply of electricity in bulk; but the Council declined to furnish it. The recommendation was carried with four dissentients.

Strikes of Gas Workers Threatened at Goole.—An extraordinary situation was created at Goole last Saturday morning; the employees at the gas-works, which are in the hands of the Urban District Council, threatening to come out on strike. The men, who are members of the local Dockers' Union, recently successfully demanded an increase of wages. They then asked that one of the employees who had not joined the Union should do so; but he would not comply. The result was that the men refused to work with him. They were in a very determined mood; but eventually the trouble was tided over by the Chairman of the Gas Committee (Mr. Bickerton) promising to bring the matter up at a special meeting of the Council yesterday.

Paper-Bag Cookery Demonstrations at Reading.—Reading ladies have lately been keenly interested in the paper-bag cookery demonstrations which have been given at a large establishment in the town, with the aid of a gas-cooker. It was clearly demonstrated that the food did not shrink (2 oz. in the pound being saved), and that it retained its natural flavour. The *chef* stated that his usual practice was to turn the gas-cooker full on for ten mibutes before placing the food in the oven, and then to reduce the supply to one-half. Though the paper bag is applicable for use with a coal-range, the best results are obtained from a gas-cooker, as the heat of the oven can be more easily regulated, and there is no waste of fuel, to say nothing of the cleanliness compared with the cinders and ashes of a coal-fire. When the cooking is finished, the paper bag is put into the waste-paper basket, and the cooker is turned out.

Views on Electricity at Skegness.—The Skegness Urban District Council have agreed to set apart a day to consider fully the advisability of applying for an Electric Light Provisional Order. It was explained by the Chairman (Mr. J. H. Shelley) that, in view of the situation with regard to the Gas Company and the costs of the Water Purchase Bill, they might considerably improve their position by applying for the powers named, so that, should they transfer them or allow the work to be carried out by contractors, they would be able to do so without losing the ultimate control. In this way, the undertaking would never get out of their hands, as had been the case with the gas-works. The scheme, he felt sure, would be a remunerative one; and he expressed the opinion that the possession of the powers would greatly improve the position of the Council when they came to buy up the gas undertaking, "as it would be argued that there was no prospective value in the gas-works, inasmuch as the revenue would be depreciated by the electric light undertaking."

Lighting and Water Supply of Delhi during the Durbar.—In the course of an article in "The Times" on Monday last week, the special correspondent of that paper in Delhi gave particulars of the preparations now approaching completion for the forthcoming Durbar. Referring to the supply of light and water, he said: "Next to transportation, the lighting and water supply were the biggest problems to be solved; and they have been dealt with on a scale of no less magnitude than the rest. It is estimated that the camps will require 2 million gallons of filtered water per diem; and to meet this demand, 50 miles of mains and 25 miles of distributing pipes have been laid down to carry the Delhi water supply into practically every part of the vast encampment. A formidable power-house has been erected in a central position to generate electric light not only for all the tents and roads within the camp area, but also for the whole line of communications with the city. I understand the supply of current will be about double the amount consumed by a town of the size of Brighton."

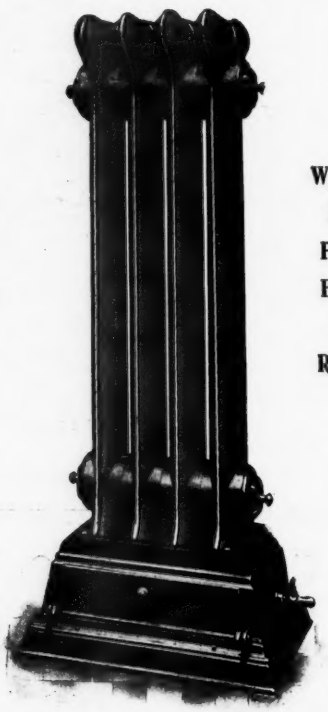
Distribution of Petrol in Pipes.—The following remarks on this subject appeared in the Engineering Supplement of "The Times" last Wednesday: "There is evidence of a disposition to take seriously the suggestion of laying one or more pipe-lines from the estuary of the Thames to the scattered districts of the Metropolis, for the conveyance of petrol. . . . As a commentary upon the steps taken to safeguard the public, the proposal is of considerable significance. The truth is that the stringent regulations now in force governing the conditions of storage and transport of petrol have been so effective, that the public are scarcely aware of the fire risks that would follow if petrol were under less perfect control. Even within a restricted area, the conveyance of petrol through pipes in the neighbourhood of public thoroughfares would be open to grave objection. In any such pipe system, some amount of pressure would be necessary; and it does not require much imagination to picture what would happen in the event of a leak at a joint, the fracture of a pipe, or the failure of a valve. The handling of petrol in bulk, in such a manner as to prevent leakage of the spirit itself and of its vapour, is a task demanding the utmost care and knowledge. Even as things are, trouble of a very serious kind has occasionally been attributed to petrol which has been alleged to have found its way along drains to sewage-pumping stations. On the other hand, it may be contended that coal gas is distributed through pipes with comparative safety. But it is obvious that the fire risk in the case of petrol is far greater than in the case of coal gas."

Pure Heated Air

by using the

CANNON 'TORRID'

Gas Heated Radiator.



Fitted with Luminous Burners.

With Trivet Door at Front and Back, and Copper Reflectors.

FACTS as proved by Scientific Test:—

NO FLAME CONTACT WITH COLD SURFACES, securing Perfect Combustion.
NO FUMES—NO FLUE REQUIRED.
NO EXPOSURE OF FLAME.
NO CONDENSATION IN TUBES, and therefore
NO CORROSION OF TUBES.

Ask for our "Congenial Warmth" Booklet, containing full report of this Test, carried out by a well-known Gas Engineer.

Manufacturers:—

CANNON IRON FOUNDRIES, Ld.,

DEEPFIELDS, Nr. Bilston, Staffs., Eng.

London Office and Show-Rooms:—

18, HOLBORN VIADUCT, E.C.

Bideford Water Supply.—At a recent meeting of the Bideford Town Council, the Sub-Committee who have had the water question under consideration presented a report of an interview with Mr. Baldwin Latham, who advised the Bibery scheme in preference to the Stafford Lake scheme, which latter he believed would cost more than was thought. The Committee further reported that Mr. Bolton, of London, had suggested a scheme of pumping water by turbine from the Torridge above Wear Gifford. Upon this scheme Mr. Latham made a detailed report, which the Sub-Committee suggested should be first taken in committee. They recommended that the Council should communicate with the Local Government Board, asking their consent to bore out the water-mains; that steps should be taken to purchase the land required; and that the rest of the question be referred back to the Water Committee. The report was adopted.

South Molton Water Supply.—An inquiry was recently held at South Molton, by Mr. P. M. Crosthwaite, with reference to an application by the Town Council to the Local Government Board for permission to borrow £2300 for the improvement of the water supply, including new mains and filters. It was stated by the Town Clerk (Mr. R. L. Riccard) that various suggestions made in 1909 by the Local Government Board had now been carried out, including the scraping of the mains, and the laying of a new pipe in one of the streets. The Surveyor (Mr. H. E. C. Rayner) said that the scraping of the mains had led to an increase in the quantity of water flowing into the town from 108,000 to 239,600 gallons per day. Mr. Crosthwaite expressed surprise that the pipes had stood the strain of scraping. The water was very soft, and he thought lime should be added to harden it. If the filters had been placed near the reservoir years ago, they might not have had the present difficulty with the mains.

Ammonium Finance Syndicate, Limited, is the title of a Company which has been registered with a capital of £200,000, in £1 shares, to carry on the business of manufacturers of, and dealers in, coke, coal, briquettes, coal tar, pitch, asphaltum, ammoniacal liquor, ammonia, and other residual products obtained from the working of coal, slack, dross, and peat fuel of all kinds, chemical manufacturers, &c., and to acquire, prospect, examine, and explore land in any part of the world.

The extensive assortment of gas fittings, meters, high-pressure gas apparatus, electric and water fittings, sanitary and fire appliances, and art metal work of which Messrs. James Milne and Son, Limited, are the designers and manufacturers, is very effectively displayed in the new list (No. 7) they are now issuing. When it is mentioned that the articles shown occupy 157 large pages, it will, we think, be acknowledged that the words used at the opening of this paragraph are fully justified.

Now that the lighting season has fairly commenced, the Welsbach Light Company, Limited, of 344-354, Gray's Inn Road, are issuing a booklet showing how satisfied consumers—who, they point out, are the gas suppliers best assets—can be obtained by co-operating with them. They have produced a quantity of attractive literature, show-cards, and many other devices; and they are anxious that their trade customers should have whatever quantity they can advantageously distribute. In the booklet is a reduced illustration of the Company's large poster (120 in. by 80 in.) which is being exhibited all over the kingdom, and also of one of their attractive show-cards. Another booklet, in an artistic wrapper, furnishes particulars of the Welsbach-Kern radiators. Accompanying the pamphlets is an order form for the various kinds of the Company's advertising material.

APPLICATIONS FOR LETTERS PATENT.

24,631.—Seamon, P. R., "Gas lighting and extinguishing." Nov. 6.
24,639.—Atkinson, A. H., "Gas-meters." Nov. 6.
24,652.—Foyle, C. H., "Containers for mantles." Nov. 6.
24,654.—Drägerwerk, Heinr. and Bernh. Dräger., "Testing gas." Nov. 6.
24,698.—Simpson, S., "Coin-freed meters." Nov. 6.
24,707.—Gunning, J., "Lighting and extinguishing lamps." Nov. 7.
24,720.—Dempster, R., and Sons, Ltd., and Horsfall, J. E., "Valves for gas distribution." Nov. 7.
24,730.—Hughes, R., "Globe carriers." Nov. 7.
24,756.—Wickett, J. H., and Antis, A., "Automatically controlling the flow of gas." Nov. 7.
24,765.—Brown, E. W., "Gas-burner." Nov. 7.
24,767.—Stimson, E. F., "Gas-cookers." Nov. 7.
24,853.—Stuart, A. M'D., "Joints in water-pipes." Nov. 8.
24,872.—Mills, D., W., & G., "Apparatus heated by gas." Nov. 8.
24,892.—Still, W. M., and Sons, Ltd., and Abbott, F. E., "Air-gas apparatus." Nov. 8.
24,905.—Lake, H. W., "Liquefiable hydrocarbon gases." A communication from F. R. W. Schroeter. Nov. 8.
24,916.—Simpson, S., "Coin-freed meters." Nov. 8.
24,918.—Vergnes, L., "Inverted burner." Nov. 8.
24,927.—Fiechtl, L., and Breuning, R., "Automatically closing gas-pipes." Nov. 8.
24,928.—Beuthner, A., "Drawing coke from gas-retorts." Nov. 8.
24,943.—Hurst, J. H., "Gas-compressors." Nov. 9.
24,946.—Mitchell, L., and Hamer, G. T., "Pipe-couplings." Nov. 9.
24,973.—Minder, S., "Gas smoothing-iron." Nov. 9.
24,997.—Nevill, C. H., and Adcock, S. R., "Catching tar, dust, and the like from gases." Nov. 9.
25,008.—Thorp, T., F., & H. T., "Meters." Nov. 10.
25,010.—Kettle, H. A., "Vaporization of oil." Nov. 10.
25,063.—Winstanley, H. M., "Gas-muffles." Nov. 10.
25,072.—Sharp, A., "Generation and transmission of power from gas-engines." Nov. 10.
25,075.—Marr, J., "Purification of gases." Nov. 10.
25,103.—Benton, W. A., "Gas exhauster or compressor." Nov. 11.
25,110.—Potter, W. E., "Water and gas tap." Nov. 11.
25,111.—Baynes, F. W., "Gas-making apparatus." Nov. 11.
25,171.—Bessert, E., "Valves or cocks." Nov. 11.

PARKINSON
FIRES & RADIATORS.

The "PATHAN."

One of the **P. S. C.** Series,

The Popular Priced Fires.

GAS-HEATED STEAM RADIATORS

Plain and Ornamental Designs,
Single and Double Columns,
also
Luminous Flame Radiators.

The

PARKINSON

STOVE COMPANY, LTD.,

BIRMINGHAM & LONDON.

Mr. W. Garnet Wernham, of Cathedral Chambers, Temple Row, Birmingham, has been appointed by Messrs. James Milne and Son, Limited, as their sole agent for the Birmingham district.

The subject of the fixing and maintenance of "Victor" gas-boilers was dealt with by Mr. Thomas Potterton, in a lecture which he delivered last week at Greenwich to the district fitters of the South Metropolitan Gas Company.

During service in Cemetery Road Congregational Church, Sheffield, last Sunday, an electric wire conveying the current used for blowing the organ fused, causing flames in one of the aisles. The congregation were quietly dismissed. The damage was confined to the aisle in which the fire originated.

The Vapour Gas Corporation, Limited, has been registered with a capital of £5000, in £1 shares, to acquire from H. Cowx the benefit of, and to work, certain existing inventions relating to improvements in hydrocarbon vapour gas-generators, &c, together with the British and foreign patents therein.

Provincial gas managers vie with each other in the production of "catchy" advertisements. In the "Ilfracombe Chronicle" for last Saturday there was an effective one showing a "Wizard" gas-stove; and the question was asked: "What is this magic thing?" The answer—"A Gas-Fire"—was in prominent characters enclosed in a border; and the qualities of the appliance as a clean, healthy, and convenient medium for giving out heat were duly emphasized.

Alderman D. Wade has been selected to follow Mr. Horace Geldard (who was unsuccessful in the recent municipal election) in the Chairmanship of the Bradford Corporation Gas Committee, with Mr. J. H. Barraclough as Deputy-Chairman.

The Board-room of the Hastings and St. Leonards Gas Company was bright with flowers and brilliantly lighted last Wednesday evening, on the occasion of the annual smoking concert of the Gas-Works Sports Club. The General Manager of the Company (Mr. C. E. Botley, M.Inst.C.E.) presided; and among those present were the Assistant-Manager (Mr. C. F. Botley, Assoc.M.Inst.C.E.), and the Secretary of the Eastbourne Gas Company (Mr. J. S. Garrard). Mr. F. J. Winter said that during the past season the club had been very successful. The first eleven played seventeen matches, winning thirteen, drawing two, only meeting defeat on two occasions, and on one of those by one run only. This showed decided improvement on the result in the previous season, when they played seventeen matches, winning eleven, losing five, and drawing one. Mr. I. Kendall proposed "The Club and the President;" remarking that the former had done splendidly and that Mr. Botley was an excellent President. The toast having been received with musical honours, the President, in reply, emphasized the value of a cricket club for employees, and said he was very glad their own club had achieved such success. He hoped it might continue. Mr. C. F. Botley proposed "The Vice-President and the Visitors," to which the Rev. H. W. Jeanes and Mr. Garrard responded. The prizes were presented by Miss Molley Botley.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Nov. 18. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar, crude	per ton	—	20/– 25/6	22/– 26/–	—	21/– 25/–	—
Pitch	,,	42/6	40/–	40/6	40/–	39/3	40/–
Benzol, 90%	per gallon	1/3	–/11⅜	–/11½	—	–/10½	–/11½
Benzol, 50-90%	,,	—	–/11⅛	–/10½	—	–/10½	—
Toluol, 90%	,,	1/1	–/11⅛	–/10½	–/10	–/10¼	–/11
Crude naphtha, 30%	,,	—	–/4½	–/4½	–/3¾	–/4	—
Light oil, 50%	,,	—	–/3½	–/3¾	–/3½	–/3⅜	—
Solvent naphtha, 90-160	,,	—	–/11	–/10	–/10	–/10½	–/11⅛
Heavy naphtha, 90-190	,,	—	–/11¼	–/11	–/11¼	–/11⅜	–/11½
Creosote in bulk	,,	–/3	–/2½	–/2⅝	—	–/2⅝	–/2
Heavy oils	,,	—	–/2⅝	–/2½	–/2¾	–/2½	–/2¾
Carbolic acid, 60's	,,	2/5	2/2½	2/3	—	2/2	2/3
Naphthalene, crude drained salts	per ton	—	43/– 46/–	42/6	47/6	50/–	—
,, pressed	,,	—	61/6	63/–	60/–	60/– 75/–	—
,, whizzed	,,	—	—	—	70/– 72/6	65/– 75/–	62/6
Anthracene	per unit	–/1⅞	–/1½	–/1½	–/1¼	–/1¼	—

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 518.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 12	5	Alliance & Dublin Ord.	79—82	..	6 1 11	200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	125—130	..	4 12 4
874,000	Stk.	July 14	4	Do. 4 p.c. Deb.	93—95	..	4 4 3	561,000	Stk.	Aug. 16	10	Liverpool United A.	218—220	..	4 10 11
250,000	5	Sept. 28	7	Bombay, Ltd.	6—6½	..	5 7 8	718,100	,,	,,	7	Do. B.	164—166	..	4 4 4
50,000	10	Aug. 31	15	Bourne- mouth Gas & Water Co.	10 p.c.	..	5 1 8	306,083	,,	June 30	4	Do. Deb. Stk.	102—104	..	3 16 11
311,810	10	,,	7		B 7 p.c.	..	4 3 7	75,000	5	June 15	6	Malta & Mediterranean	4⅞—5⅛	..	5 17 1
75,000	10	,,	6		Pref. 6 p.c.	..	4 1 4	560,000	100	Oct. 2	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
380,000	Stk.	Aug. 16	13	Brentford Consolidated	256—261	..	4 19 7	250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
330,000	,,	,,	10	Do. New	198—203	..	4 18 6	541,920	20	Nov. 10	3½	Monte Video, Ltd.	12½—12¾*	..	5 9 10
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0	1,775,892	Stk.	July 28	4½	Newc'tle&G'tesh'd Con.	101—102	..	4 5 9
206,250	,,	June 15	4	Do. 4 p.c. Deb.	98—100	..	4 0 0	529,705	Stk.	June 30	3½	Do. 3½ p.c. Deb.	87—89	..	3 18 8
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	217—222	..	4 19 1	55,940	10	Aug. 31	7/7/0	North Middlesex 7 p.c.	14½—15½	..	4 14 10
246,320	,,	,,	8	Do. A Ord. Stk.	156—159	..	5 0 8	300,000	Stk.	Apl. 27	8	Oriental, Ltd.	138—140	..	5 14 4
490,000	20	Sept. 28	12½	British	44½—45½	..	5 9 11	60,000	5	Sept. 28	8	Ottoman, Ltd.	6½—7	..	5 14 4
120,000	Stk.	June 30	4	Do. 4 p.c. Deb. Stk.	94—96	..	4 3 4	31,800	53	Aug. 16	13	Porisea Island A	140—145	..	4 14 10
109,000	,,	Aug. 16	6	Bromley, A 5 p.c.	117—122	..	4 18 4	60,000	50	,,	13	Do. B	133—138	..	4 14 2
165,700	,,	,,	4½	Do. B 3½ p.c.	90—92	..	4 17 10	100,000	50	,,	12	Do. C	130—135	..	4 8 11
82,278	,,	,,	5½	Do. C 5 p.c.	105—110	..	5 0 0	398,490	5	Oct. 12	8	Primitiva Ord.	7⅞—7⅞	..	5 4 11
55,000	,,	June 30	3½	Do. 3½ p.c. Deb.	82—84	..	4 3 4	796,980	5	June 30	5	Do. 5 p.c. Pref.	5⅛—5⅝	..	4 13 0
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	95—97	..	4 2 6	488,900	100	June 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—	312,650	Stk.	June 30	4	River Plate 4 p.c. Deb.	95—97	..	4 2 6
100,000	10	—	—	Do. 4½ p.c. Pref.	4½—5½	..	—	250,000	5	Sept. 28	12	San Paulo, Ltd.	10½—11	+¼	5 9 1
100,000	Stk.	June 30	4½	Do. 4½ p.c. Deb. Stk.	80—83	..	5 8 5	115,000	10	,,	6	Do. 6 p.c. Pref.	11⅝—12	..	5 0 0
157,150	Stk.	Aug. 16	5	Chester 5 p.c. Ord.	110—112	+1	4 9 3	125,000	50	July 1	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
1,513,280	Stk.	,,	5/9/4	Commercial 4 p.c. Stk.	110—112	..	4 17 7	135,000	Stk.	Aug. 31	10	Sheffield A	238—240	..	4 3 4
660,000	,,	,,	5½	Do. 3½ p.c. do.	105—107	..	4 19 8	209,984	,,	,,	10	Do. B	238—240	..	4 3 4
475,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.	76—78	..	3 16 11	523,500	,,	,,	10	Do. C	238—240	..	4 3 4
800,000	Stk.	May 31	4	Continental Union, Ltd.	90—95	..	4 4 3	90,000	10	Sept. 28	6	South African	8—9	..	6 13 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	135—137	..	5 2 2	6,429,895	Stk.	Aug. 16	5/9/4	South Met., 4 p.c. Ord.	116—118	..	4 12 8
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9	1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	79—81	..	3 14 1
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2	209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	155—157	..	5 8 3
840,150	10	July 28	10	European, Ltd.	19½—20½	+½	4 17 7	605,000	Stk.	,,	5⅝	S'th Suburb'n Ord. 5 p.c.	119—121	..	4 13 6
16,160,600	Stk.	Aug. 16	4/14/8	Gas-light and Coke Co.	4 p.c. Ord.	..	4 9 9	60,000	,,	,,	5	Do. 5 p.c. Pref.	117—120	+2	4 3 4
2,600,000	,,	,,	3½		3½ p.c. max.	..	4 0 11	117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	121—123	..	4 1 4
4,062,235	,,	,,	4		4 p.c. Con. Pref.	..	3 16 11	502,310	Stk.	Nov. 10	5	Southampton Ord.	106—108*	..	4 12 7
4,531,705	,,	June 15	3		3 p.c. Con. Deb.	..	3 13 2	120,000	Stk.	Aug. 16	7½	Tottenham and Edmonton Tuscan, Ltd.	A 5 p.c.	..	4 16 3
258,740	Stk.	Sept. 14	5	Hastings & St. L. 3½ p.c.	94—96	..	5 4 2	483,940	,,	,,	5⅝		B 3½ p.c.	..	4 16 1
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—	149,470	,,	June 15	4		4 p.c. Deb.	..	4 1 8
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	17—17⅜	..	6 5 9	182,380	10	June 15	8			..	8 13 0
131,000	Stk.	Sept. 14	7½	Ilford A and C	154—157	..	4 15 6	149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
65,780	,,	,,	6	Do. B	125—128	..	4 13 9	236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	113—115	..	4 6 11
65,500	,,	June 30	4	Do. 4 p.c. Deb.	94—96	..	4 3 4	255,636	Stk.	Aug. 31	6½	Wands- worth	A 5 p.c.	..	4 14 10
4,940,000	Stk.	Nov. 10	9	Imperial Continental	183—185*	..	4 17 3	85,766	,,	June 30	3		B 3½ p.c. Deb. Stk.	+2	4 0 0
1,235,000	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	90—92	..	3 16 1						3 p.c. Deb. Stk.	73—75	

Prices marked * are "Ex. div."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

ENGINEER AND GAS MANAGER. Cleckheaton Urban District Council. Applications by Dec. 6.
GAS MANAGER. Quakers Yard Gas and Water Company. Applications by Nov. 30 to Dr. Leigh, Treharris.
CHEMICAL EXPERT (Coking and Bye-Products Plant). A. Gillespie and Son, Glasgow.
DRAUGHTSMAN. Applications by Nov. 25 to No 5481.
DRAUGHTSMAN. No. 5482.
DISTRICT INSPECTOR. Reading Gas Company.

Appointments Wanted.

ASSISTANT GENERAL MANAGER (Gas-Stove Trade). No. 5476.
CHEMICAL PLUMBER, &c. No. 5450.

Plant, &c. (Second-Hand), for Sale.

GAS ENGINES, COMPRESSORS, GOVERNORS, &c. Lochgelly Gas Company.
NEWTON LANE GAS PLANT. Tenders to the War Office by Dec. 11.

"Journal" Volumes Wanted. No. 5483.

Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. By Auction. Nov. 28.
BISHOP'S STORTFORD, &c., GAS AND ELECTRICITY COMPANY. By Auction. Nov. 28.
BRISTOL GAS COMPANY. By Auction. Dec. 14.
CHAPEL WHALEY AND DISTRICT GAS COMPANY. By Tender. Dec. 1.

Stocks and Shares *(continued)*—

EAST GRINSTEAD GAS AND WATER COMPANY. By Auction. Dec. 5
HERNE BAY GAS AND COKE COMPANY. By Auction. Nov. 28.
HYTHE AND SANDGATE GAS COMPANY. By Auction. Nov. 28.
NORTH MIDDLESEX GAS COMPANY. By Auction. Dec. 12.
SHREWSBURY GASLIGHT COMPANY. By Tenders. Dec. 16.
SOUTH KENT WATER COMPANY. By Auction. Dec. 12.
SOUTH WEST SUBURBAN WATER COMPANY. By Auction. Dec. 5.
SOUTHEND WATER-WORKS COMPANY. By Auction. Nov. 28.
SOUTHEND WATER-WORKS COMPANY. By Auction. Dec. 5.
TENDRING HUNDRED WATER-WORKS COMPANY. By Auction. Nov. 28.

TENDERS FOR

Coal.

NOTTINGHAM CORPORATION. Tenders by Dec. 7.

Coke.

COMMERCIAL GAS COMPANY. Tenders by Nov. 27.

Fire-Clay Goods.

SHEFFIELD UNITED GASLIGHT COMPANY. Tenders by Dec. 1.
NOTTINGHAM GAS DEPARTMENT. Tenders by Nov. 27.

General Stores (Picks, Shovels, &c., Ironmongery, Cement, Lime, Bricks, Timber, Earthenware Pipes, Castings, Flags, Setts, Gravel, Brushes, Disinfectants, &c., &c.).

NOTTINGHAM CORPORATION. Tenders by Dec. 7,
NOTTINGHAM GAS DEPARTMENT. Tenders by Nov. 27.

Meters, &c.,

NOTTINGHAM GAS DEPARTMENT. Tenders by Nov. 27.

Plumbing Work.

NOTTINGHAM CORPORATION. Tenders by Dec. 7.
NOTTINGHAM GAS DEPARTMENT. Tenders by Nov. 27.

Purifier Boxes.

SHEFFIELD UNITED GASLIGHT COMPANY. Tenders by Dec. 5.

Scrubbers and Washers.

SMETHWICK GAS DEPARTMENT. Tenders by Dec. 2.

Steel Roof and Floor.

SHEFFIELD UNITED GASLIGHT COMPANY. Tenders by Dec. 5.

Sulphuric Acid.

SALFORD GAS DEPARTMENT.

Tar (Refined), Creosote Oil, and Pitch.

NOTTINGHAM CORPORATION. Tenders by Dec. 7.

Tar and Liquor.

GAINSBOROUGH GAS DEPARTMENT. Tenders by Nov. 24.
SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY. Tenders by Dec. 6.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

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O'NEILL'S OXIDE
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LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
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Albert Chemical Works, BRADFORD,
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Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
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GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
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NYMEGEN, HOLLAND.
General Manager (for England and Wales)—
W. T. P. CUNNINGHAM,
13, Arcadian Gardens, Wood Green, LONDON, N.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

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Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

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A BIG profit for Agents.—Agents wanted to make good money selling "Frugals"—the wonderful gas-savers. Every private and business house needs them; liberal Profits. Write at once for Terms and Particulars. LEFTWICH & Co., Gas Lighting Dept., 34, James Street, Camden Town, LONDON, N.W.

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PAINT FOR GAS-WORKS.
"KLEENOFF." THE COOKER CLEANER.
BALE & CHURCH, LTD.,
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SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
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Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 1588 AVENUE (3 lines).

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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 3, p. 9.

SULPHURIC ACID—Specially prepared for Sulphate of AMMONIA and BENZOL Recovery Plants. JOHN NICHOLSON & SONS, LTD., Hunslet Chemical Works, LEEDS. Tele.: "NICHOLSON, LEEDS." Telephone: (Two lines), Nos. 2420 and 2421.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Church Fenton, near LEEDS.

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SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness with efficiency for Repairs.
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ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, Rose Mount Iron-Works, Elland.

COAL TAR wanted. Brotherton and Co., Ltd., Tar Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 5d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d. "SUBJECT-MATTER of PATENTS," 6d. MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 943 Holborn.

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PREPARED from Pure Iron. Twice as rich as Bog Ore. Gives no back Pressure. The Cheapest in the Market. Read Holliday and Sons, Ltd., Huddersfield.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 years. References given to Gas Companies.

AMMONIACAL Liquor wanted. Brotherton and Co., Ltd., Ammonia Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. Brotherton and Co., Ltd., Chemical Manufacturers. Works: Birmingham, Leeds, Sunderland, and Wakefield.

PATENTS.—Withers & Spooner, Chartered Patent Agents, 323, High Holborn, London. Established 27 years. British, Foreign, and Colonial Patents obtained at fixed and inclusive fees. Designs and Trade Marks Registered. Send for free copy of our "GUIDE TO PATENTS," giving full information, fees, &c.

BROTHERTON & CO., LIMITED. Offices: City Chambers, Leeds. Correspondence invited.

AMMONIACAL Liquor wanted. Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs. Telegrams: "Chemicals."

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

TAR WANTED.

BURNDEN Tar Company (Bolton), Ltd. Telephone: 258 Bolton. Telegrams: "Tar Bolton." Hulton Chemical Works, BOLTON.

AMMONIA. Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services. It is also used for the enrichment of Gas. Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne. Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

FOR Instructions on Polishing and Cleaning Gas-Cookers and Gas-Fittings, read Canning Handbook on Polishing, Electro-Plating, and Lacquering. Fully illustrated. Price 2s. 3d., post free; abroad, 2s. 6d. W. Canning and Co., Birmingham, and 18 to 20, St. John's Square, Clerkenwell, London, E.C.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

WANTED to Purchase, Volumes (Bound or Unbound) of the "JOURNAL OF GAS LIGHTING" from, and including, the Year 1900 to the present date. Must be complete and in fair condition. Address, No. 5483, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE UNIVERSITY OF LEEDS.
(Department of Coal Gas and Fuel Industries with Metallurgy.)
SPECIAL LECTURE COURSES OPEN TO THE PUBLIC.

(*A.*) The Chemistry of Coal and the Manufacture of Coal Gas.—

A COURSE of 22 Lectures on Wednesdays at Six p.m. and Thursdays at Nine a.m., during eleven consecutive weeks, as under:—
Commencing Jan. 10.—Six Lectures on "The Chemistry of Coal and its Carbonization," by Professor Bone.
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Fee for the whole Course, £1 1s.; for Part I. only, 10s. 6d.

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A Course of Eight Lectures on Saturday Afternoons at 3 o'clock, commencing Saturday, Jan. 13, by Mr. Cyril D. McCourt.
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For further Particulars Apply to the Registrar.

CHEMICAL Plumber:—Leadburner: Practical in all branches; Erection of Towers, Chambers, Tanks, Acid, and Sulphate of Ammonia Plants. Can Take Charge and Work to Drawings or Inventions. References from Leading Firms. (Any distance.) Have Tools. Price 1s. per Hour and Travelling Fares. Address No. 5450, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GENTLEMAN (26) with exceptionally wide Manufacturing and Selling Experience in the Gas-Stove Trade, and with proved Inventive and General Ability, desires Position as ASSISTANT GENERAL MANAGER, or other Responsible Position. Salary no object for trial Engagement. Address No. 5476, care of Mr. King, 11, Bolt Court, Fleet Street, E. C.

WANTED, a Chemical Expert to Superintend Coking and Bye-product Plant. Applications, in Writing, giving Experience, References, and Terms, to A. Gillespie and Son, 65, Bath Street, Glasgow.

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QUAKERS YARD GAS AND WATER COMPANY, LIMITED.

REQUIRED, forthwith, an Experienced Gas-Works MANAGER. Salary, £150, with annual increments of £10, up to £170, when the remuneration will be reconsidered. House, Coal, and Gas provided. Applications, stating full Particulars and previous Experience, and enclosing Two recent Testimonials, to be sent under seal by the 30th inst., to the Chairman, Dr. Leigh, Glynbargoed, Trehafris R.S.O.

WANTED, a District Inspector. Applicants are requested to send full Particulars of their Age and Training, together with *copies* of recent Testimonials, and to state Wages required. No one need Apply who has not a thorough practical knowledge of Internal Gas-Fittings work, Incandescent Burners, &c., &c. A special knowledge of Mainlaying is not necessary. Applications to be sent in as soon as possible, addressed to the Engineer, Gas-Works, Reading.

WANTED, at once, for Contractors' Office, a DRAUGHTSMAN capable of Designing Structural Ironwork, Retort-Bench Ironwork, and Settings. Apply, by letter, stating Age, Experience, and Salary required to No. 5482, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

URBAN DISTRICT OF CLECKHEATON.

ENGINEER AND GAS MANAGER.

THE Council of the above District require the Services of an Experienced ENGINEER and MANAGER of their Gas Undertaking. The Person to be appointed must be Practically familiar with Gas Making in all its Branches, and will be required to Test Coal and Products and act generally under the Orders of the Gas Committee. He must have a good knowledge of Chemistry, and must be a man of Thorough Business habits. Commencing Salary, £200 per Annum, with House, Coal, Gas and Water, and Rates. Applications (on Forms to be obtained at my office) must reach me on or before Wednesday, the 6th of December, 1911. Canvassing members of the Council directly or indirectly will disqualify.

John H. Linfield,
Clerk to the Council.

Town Hall, Cleckheaton,
Nov. 21, 1911,

LOCHGELLY GAS COMPANY, LIMITED.

FOR SALE—Two Gas-Engines (Gardner 1907 5 I.H.P.) with Two Gas Compressors (Keith Blackman Company) 8000 Cubic Feet per hour capacity. May be sold singly if desired; also upwards of 100 H.P. Governors ¾-inch and 1-inch and three Mercurial Governors—one 3-inch and two 2-inch. May be seen by Applying to Mr. W. Ewing, Engineer and Manager. Offers to Mr. Robt. Small, Secretary, Town House, Lochgelly.

GAS PLANT FOR SALE.

STEAM-ENGINE AND EXHAUSTER combined, by Bryan Donkin and Co., Limited, 12-in. disc Valves. Condition perfect. Cheap to clear. Firth Blakeley, Sons, and Co., Limited, Church Fenton, Leeds.

STATION METERS, 12-in. and 18-in. Meters, latter fitted with New Drum, 12-in. perfect order. Any reasonable offer considered. Firth Blakeley, Church Fenton, *via* Leeds.

CARBURETTED WATER-GAS PLANT.—First-Class Plant Complete in every way, re-erected and started to work. Very little used. Plan and Specification and Tender submitted for re-erection quickly. Satisfaction guaranteed. Firth Blakeley, Church Fenton, *via* Leeds.

PATENT WASHER-SCRUBBER Complete. 12-inch Connections. Recently overhauled. Firth Blakeley, Church Fenton, Leeds.

SALE OF NEWTON LANE GAS PLANT.

THE Secretary of State for War is prepared to receive TENDERS for the PURCHASE of PLANT for the MANUFACTURE of HYDROGEN GAS by the Newton Lane Process, now at the Army Aircraft Factory, South Farnborough. Forms of Tender, giving full Particulars, can be obtained on Application to the Director of Army Contracts, War Office London, S.W. Tenders are to be Delivered at the War Office by Twelve o'clock on Monday, the 11th of December, 1911.

CITY OF NOTTINGHAM.

THE Works and Ways Committee are prepared to receive TENDERS for the Supply of the undermentioned STORES and MATERIALS; the Contracts to commence on the 1st of January next, and to terminate on the 31st of December, 1912:—
(*a.*) CEMENT,
(*b.*) BLUE LIAS LIME.
(*c.*) RED BRICKS.
(*d.*) BLUE BRICKS.
(*e.*) TIMBER.
(*f.*) EARTHENWARE PIPES, &c.
(*g.*) EARTHENWARE PIPES, &c. (Patent Joints).
(*h.*) IRON CASTINGS, IRON GULLEYS, &c.
(*i.*) YORKSHIRE FLAGS, KERB, &c.
(*j.*) GRANITE SETTS, KERB, and BROKEN GRANITE.
(*k.*) IRONSTONE SLAG, CHIPPINGS, &c.
(*l.*) RIVER GRAVEL.
(*m.*) COAL.
(*n.*) PICKS, SHOVELS, SCOOPS, &c.
(*o.*) IRONMONGERY.
(*p.*) SCAVENGING and other BRUSHES.
(*q.*) DISINFECTANTS.
(*r.*) REFINED TAR.
(*s.*) PITCH.
(*t.*) CREOSOTE OIL.
(*u.*) PLUMBING WORK (for Two Years).
Forms of Tender may be obtained on Applying to Mr. Arthur Brown, M.Inst.C.E., City Engineer, Guildhall, Nottingham, on payment of a Deposit of 5s. each, which will be returned on receipt of a *bona-fide* Tender, providing such Tender is not withdrawn, and is delivered by the time stated below.
Patterns and Samples may be inspected at the Eastcroft Depôt, London Road, Nottingham.
The Committee will not consider any Tender except on the authorized Form of Tender, which must be delivered to the undersigned, in the official envelope provided, on or before Thursday, the 7th of December, 1911.
The lowest or any Tender will not necessarily be accepted, and Tenders will only be accepted from persons who conform to the conditions as regards paying the local Standard Rate of Wages, &c., and to the working rules of the Nottingham District applicable to the various trades.

By order,
J. A. H. Green,
Town Clerk.

Guildhall, Nottingham.
Nov. 15, 1911.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.

TENDERS FOR TAR.

THE Directors of this Company invite TENDERS for the Purchase of the TAR produced at their Works from the 1st of January to the 31st of December, 1912. Quantity about 80,000 Gallons. Contractor to find his own Casks, and to accept Delivery at Blackhill Station. Tenders to be sent to the undersigned, not later than Wednesday, Dec. 6, 1911.

M. Richley,
Secretary.

Gas Offices, Front Street,
Shotley Bridge.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the Supply of SILICA and FIRE-CLAY GOODS required at their Works during the next Twelve Months. Specifications and Forms of Tender may be obtained upon Application to the Company's Engineer, Mr. J. W. Morrison, Commercial Street, Sheffield. The Directors do not bind themselves to accept the lowest or any Tender. Sealed Tenders, marked "Tender for Fire-Clay Goods," must be Delivered by post to Mr. Hanbury Thomas, Managing-Director, not later than the first post on Friday, Dec. 1.

Wm. Hamby,
Secretary.

Commercial Street, Sheffield,
Nov. 3, 1911.